WPM

Optimised Line Array

User Guide

WAVEFRONT
PRECISION

MARTIN AUDIO
LONDON

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Introduction: Wavefront Precision

Drawing on the research and technology behind MLA® Series, the Wavefront Precision Series is a new generation of multi-purpose line arrays designed to bring Martin Audio's legendary sound, coverage consistency and control to a broader range of touring applications, installations and budgets.

Wavefront Precision line arrays are designed as complete systems with external iKON® multi-channel amplifiers and optimised by automated DISPLAY™ software.

Adopting the principle of scalable resolution, with external, dedicated multi-channel amplifiers, Wavefront Precision line arrays are uniquely flexible, upgradeable and financially accessible.

With exceptional line array performance guaranteed by the acoustic design itself, scalable resolution unlocks the full potential of a Wavefront Precision array and provides an adaptable pathway into the world of advanced optimisation.

The greater the resolution of the array in terms of individually driven enclosures, the more precisely DISPLAY can fine-tune audience coverage and hold the frequency response and SPLs throughout the venue within a tight window specified by the user.

For the first time in the marketplace the decision on the level of resolution and control that is right for the install, client, event or budget is yours.

About This Manual

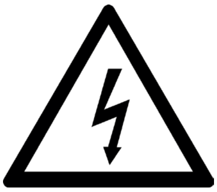
This manual explains in detail the individual components that comprise a complete WPM system. System wiring and rigging is explained and the two key software packages are covered. It is not however the intention for this manual to be the sole tutorial medium for those wishing to use the system. Extensive training media is available via the MA website and training webinars are held on a regular basis in order to help you gain a full understanding of the systems and their operation.

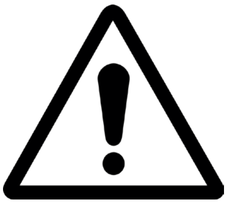
Amplification, DSP, and Networking

Wavefront Precision line arrays are designed as complete systems with dedicated, high performance iKON multi-channel Class D amplifiers.

Important Safety Instructions

- Read These Instructions
- Keep these instructions for future reference
- Heed all warnings
- Follow all instructions
- No naked flame sources such as lighted candles should be placed on the apparatus
- Do not block any ventilation openings
- Install in accordance with the Martin Audio instructions
- Do not install near any heat sources such as radiators, heat registers, stoves or other such apparatus that produce heat
- Do not defeat the safety purpose of the grounding-type plug. A grounding plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit your outlet consult an electrician for replacement of the obsolete outlet.
- Protect the power cable from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus
- This equipment must be earthed
- Only use attachments / accessories specified by Martin Audio
- Use only with wheelboard and rigging hardware specified by Martin Audio. When moving using supplied wheelboards, caution should be used to avoid injury from the cabinet tipping over
- Unplug this apparatus during lightning storms or when unused for long periods of time
- No user serviceable parts inside, refer servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped
- Do not remove covers





- Do not remove any protective earth or signal cable shield connections

CAUTION

To reduce the risk of electric shock do not remove any covers. There are no user serviceable parts inside the units. Refer servicing to qualified service personnel only. Call Martin Audio Ltd on +44 (0) 1494 535312 or e-mail info@martin-audio.com for service.

Unpacking the Units

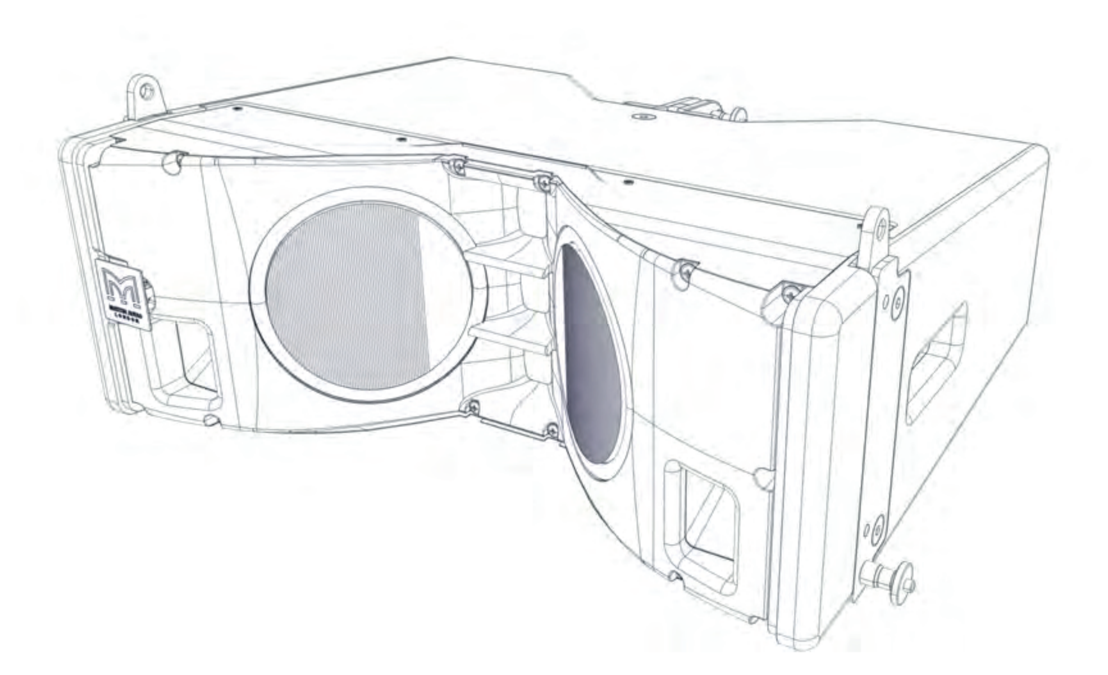
After unpacking the unit, please check it carefully for any damage. If any is found, immediately notify the carrier concerned – you, the consignee, must instigate any claim. Please retain all packaging in case you need to return the unit.

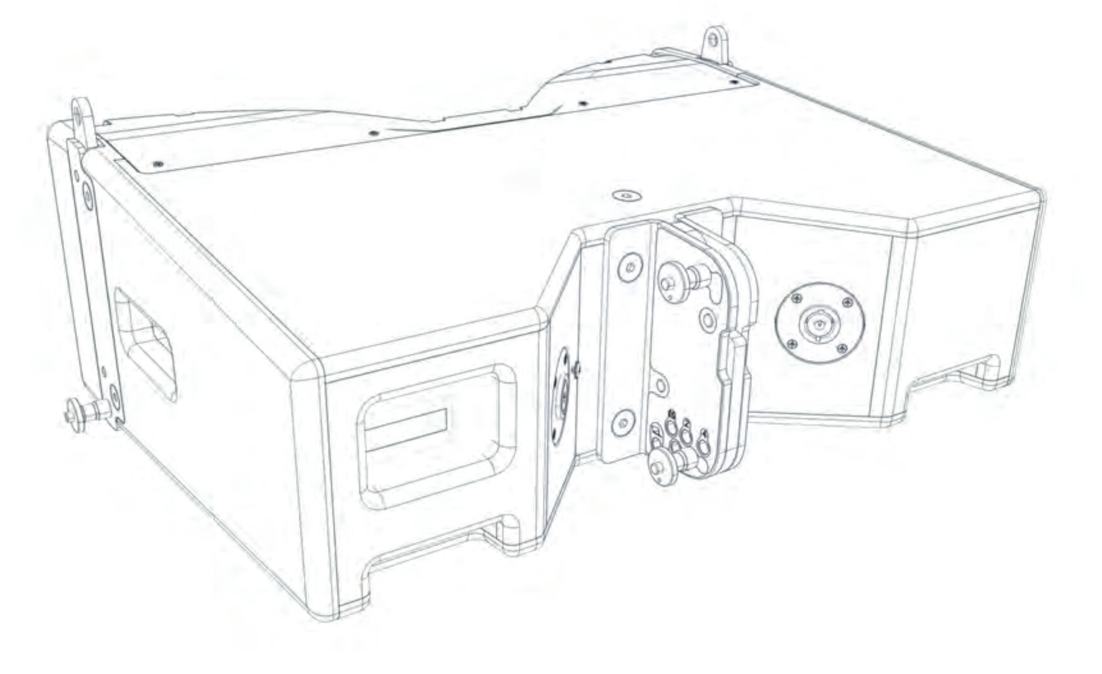
Please think of the environment.

When the product has reached the end of its useful life, please dispose of it responsibly through a recycling centre.

WPM

WPM is a two-way passive ultra-compact line array element consisting of two 6.5” reflex loaded neodymium magnet low frequency drive units, and three 1.4” neodymium magnet high frequency compression drivers loaded by constant directivity waveguides. In conjunction with automated DISPLAY system design and VU-Net network control software applications, WPM features scalable resolution for advanced array control, resulting in outstanding levels of consistent, high quality audio that can be distributed to every point throughout the audience in a venue.





WPM is incredibly versatile. Its very small footprint and light weight make it the system of choice for smaller venues which require superb fidelity, coverage consistency and control from an ultra-compact line array. It embodies the very latest acoustic technology in an ultra-compact enclosure and is the ideal system for small-to-medium scale theatres and live music venues, AV events and installations in concert halls, ballrooms and HoW.

Mechanical Design

WPM is designed mechanically to be an easy to handle, quick to rig, safe, rugged and stable touring loudspeaker. The cabinet is constructed predominantly from high grade multi-laminate birch and poplar plywood, with an integral 3-point rigging system. Two side pocket handles and two rear grip handles make handling safe and easy, and the cabinet is finished in black textured paint with a fabric-backed protective steel grille.

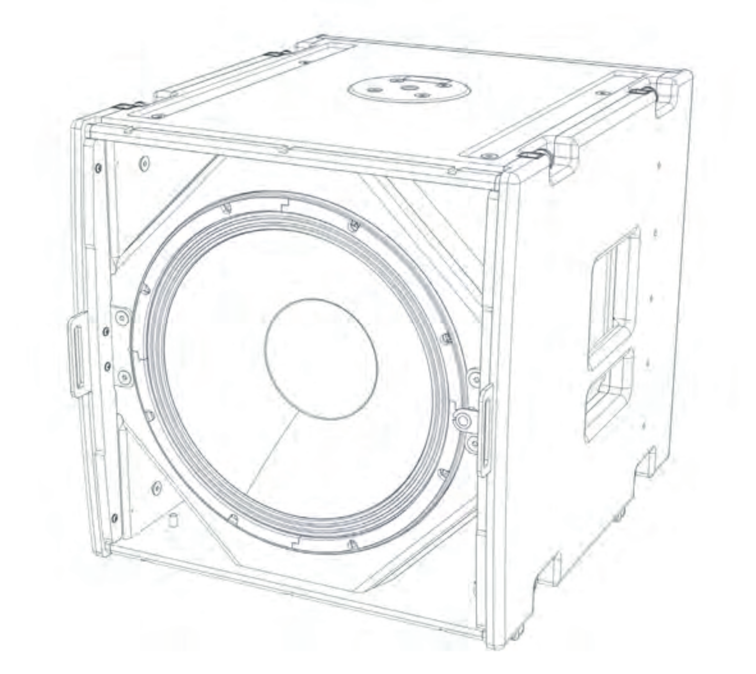
Acoustic Design

The acoustic design of WPM is uniquely innovative. The LF drivers are located in the side walls of the HF horn – an arrangement which would introduce acoustic cavities which would degrade the horizontal dispersion if conventional cone drivers were used. WPM’s drivers adopt an elegant solution by having solid moulded diaphragms which match the contours of the horn walls and maintain the continuity of the horn profile. Each LF driver also features a demodulation ring in the neodymium motor system to minimise distortion and maximise mid-band output.

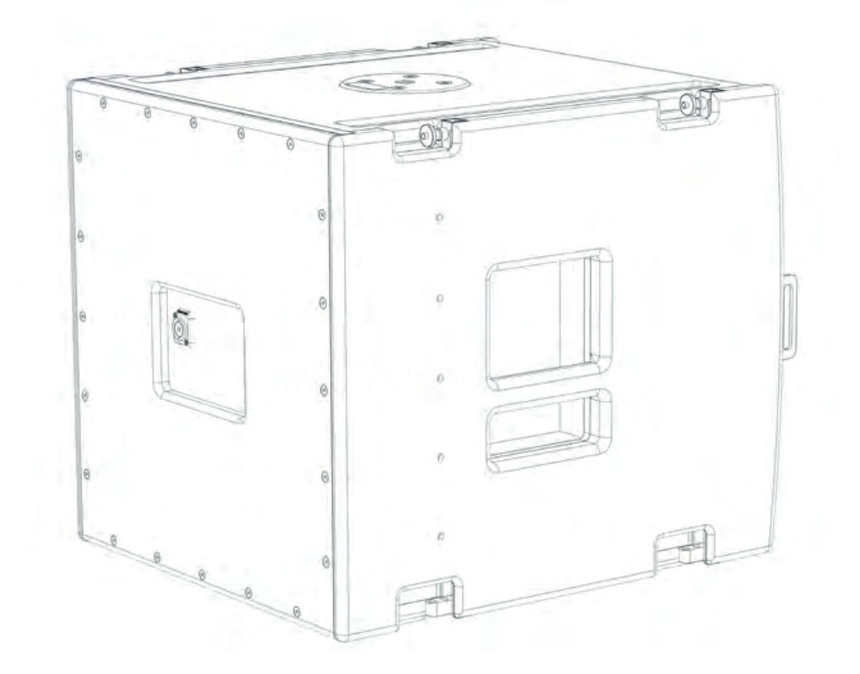
In the triple-driver HF section, each individual HF wavefront is precisely coupled to the horn throat via a short waveguide for faultless 100° horizontal constant directivity coverage. The use of multiple small HF drivers instead of traditional large diaphragm CD drivers results in less distortion and extended HF response.

Accessories

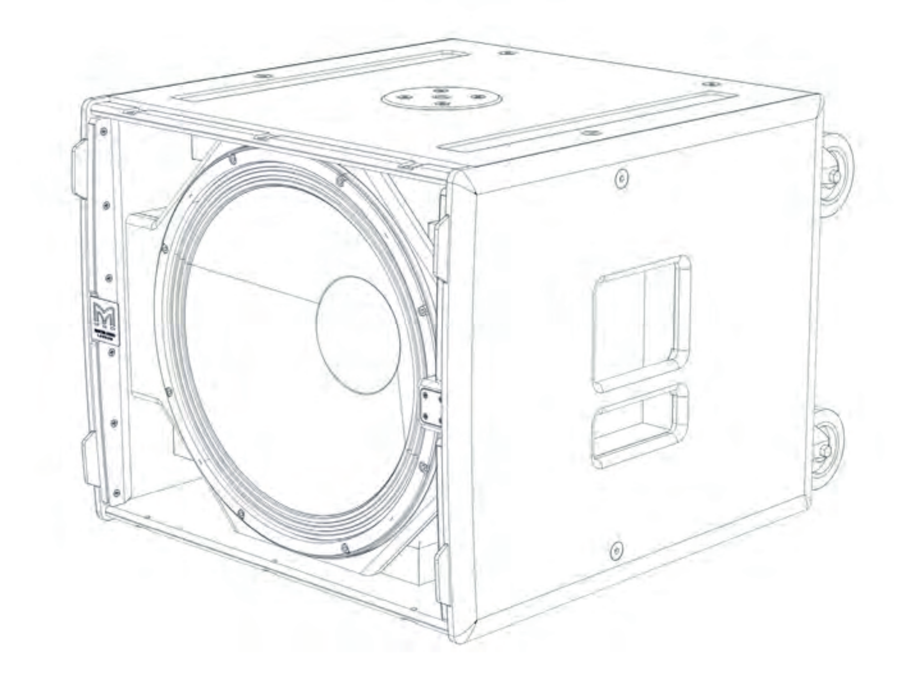
MSX Passive Subwoofer



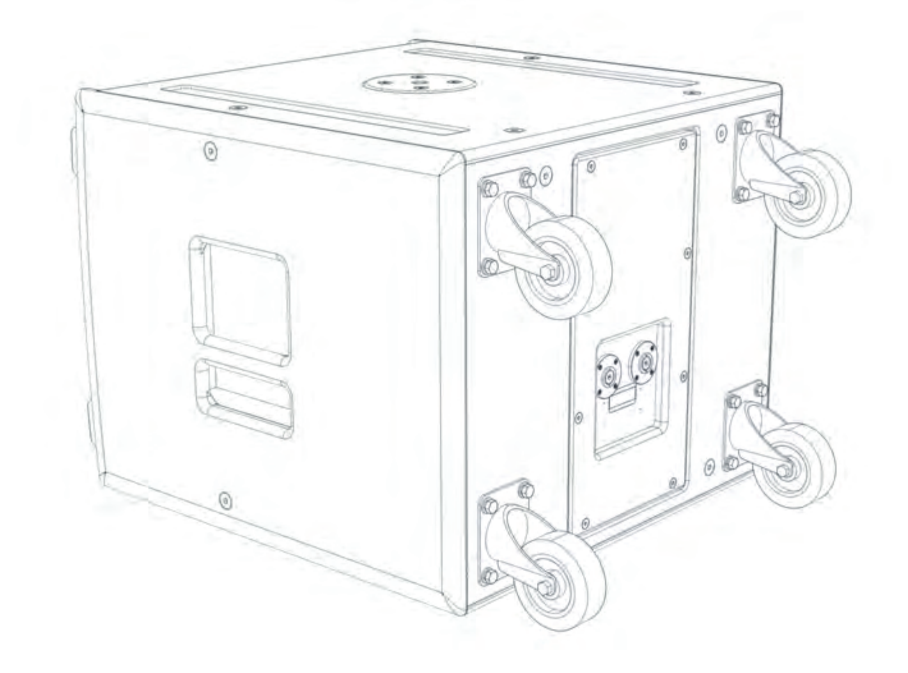
The MSX Passive is a compact, high performance passive subwoofer that extends the low frequency operating range of the WPM system to 50Hz and provides exceptional low frequency output for such a compact enclosure. It features a long excursion 15” (380mm) / 4” (100mm) voice coil driver in a compact reflex enclosure. It is the same width as the WPM cabinet and therefore can be integrated into flown arrays or pole mount systems with WPM.



SX118 Subwoofer

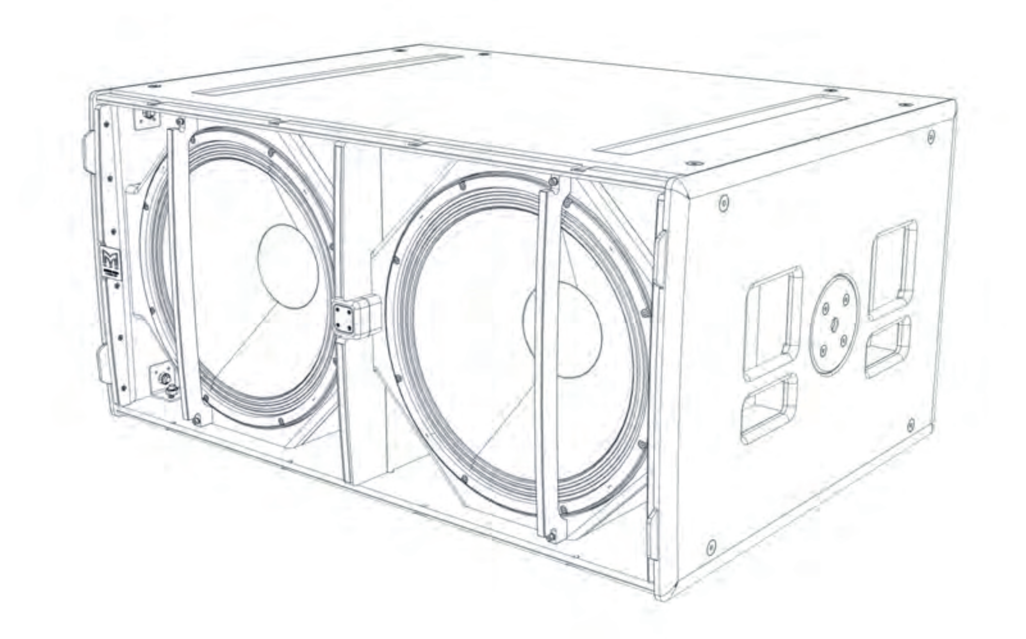


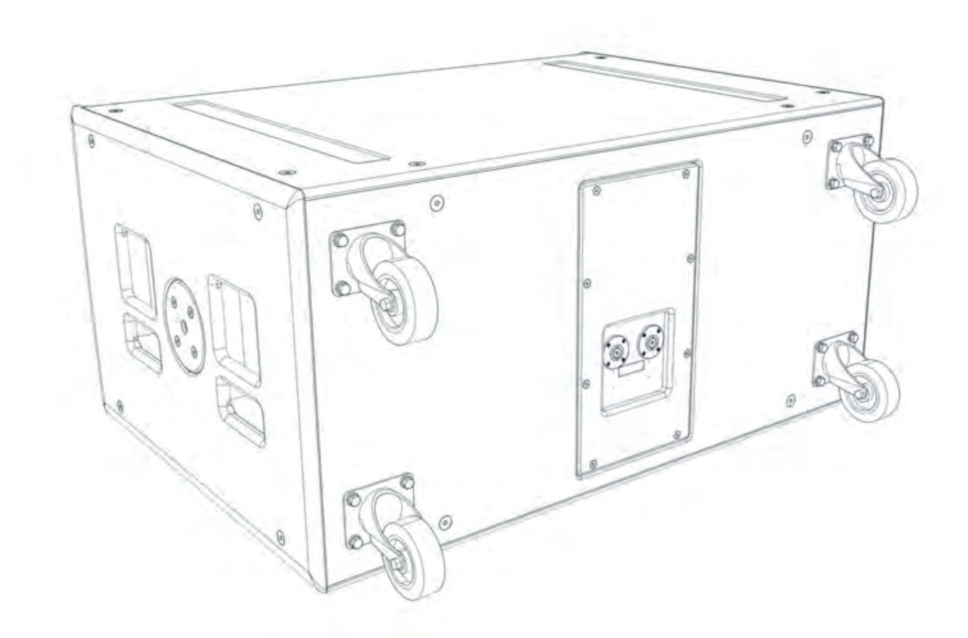
The SX118 is a compact, high performance subwoofer that extends the low frequency operating range of the WPM system to 47Hz and provides exceptional low frequency output for such a compact enclosure. It features a long excursion 18” (460mm) / 4” (100mm) voice coil driver with a water-resistant cone and triple roll surround in a compact reflex enclosure.



The design of the 18” driver maximises output while minimising power compression and distortion, and the four reflex ports have a large frontal area to reduce turbulent air noise at very high levels. The enclosure is constructed from multi-laminate birch ply, finished with a durable textured coating and equipped with a steel grille, twin grab handles, skids, flying inserts for installation and a threaded pole socket for pole-mounting up to four WPM enclosures as a simple plug-and-play system.

SX218 Subwoofer





The SX218 is a compact, high performance subwoofer that extends the low frequency operating range of the WPM system to 35Hz and provides exceptional low frequency output for such a compact enclosure. It features two long excursion 18” (460mm) / 4” (100mm) voice coil drivers with water-resistant cones and triple roll surrounds in a compact reflex enclosure.

The design of the 18” drivers maximise output while minimising power compression and distortion, and the eight reflex ports have a large frontal area to reduce turbulent air noise at very high levels. The enclosure is constructed from multi-laminate birch ply, finished with a durable textured coating and equipped with a steel grille, four grab handles, skids, and flying inserts for installation.

iK81 Amplifier

Introduction

ON
iK81
MARTIN AUDIO LONDON

The iKON iK81 is an advanced 8-channel controller amplifier which combines very high power density with superb audio performance, state-of-the-art DSP and network control for WPM systems.

The iK81 can deliver a full 1250 watts per channel into 2, 4 or 8 ohms with all channels driven while remaining highly efficient. Its high efficiency reduces the energy drawn from the mains supply and ensures the power reserves needed to deliver superb sound under arduous live conditions.

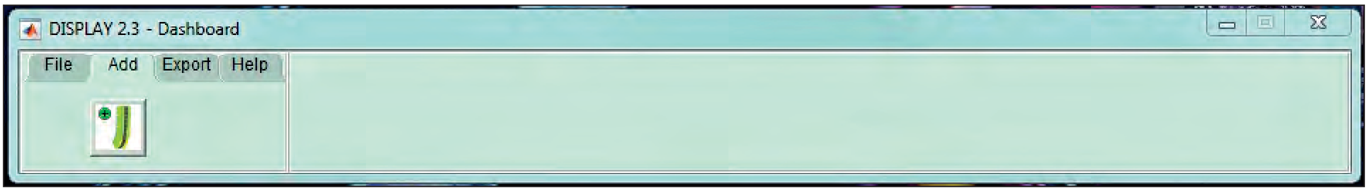
Ethernet is used for system remote control and monitoring via Martin Audio's Vu-Net software application, while a user-friendly front panel interface allows full local control of all features. Dante digital audio network inputs are also provided for digital audio distribution and control.

Powerful DSP is fully integrated into the iK81 to provide a multitude of features. It also provides up to 1000 FIR filter taps @ 48kHz on each output channel, which is essential to implement DISPLAY's wide bandwidth optimisation process in the WPM line array. The iK81 employs comprehensive protection functions to maintain safe operating conditions of both the amplifier and the loudspeakers driven — including a sophisticated loudspeaker limiter suite which incorporates peak, RMS and excursion limiting, as well as multiband limiting for passive 2-way systems.

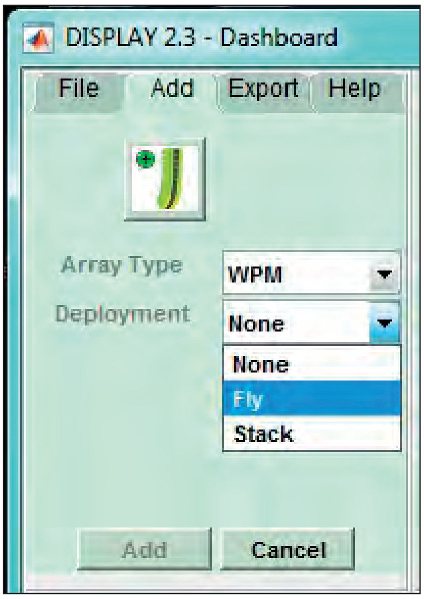
DISPLAY 2.3 Overview

DISPLAY 2.3 is a unique software application for Wavefront Precision systems which calculates both inter-cabinet splay angles and the DSP parameters for optimum system performance in any given space. Unlike competitors systems which generally use a basic geometric calculation to aim their arrays, DISPLAY uses a completely revolutionary approach using an extremely accurate computer model of the array to analyse the system performance in a drawing of the venue to precisely calculate the parameters for the system to get exactly the coverage you have specified. As a system designer you get to determine exactly how you would like the system to perform in the space; the spl contour from the front to the back of your audience region, how much spill into non-audience areas is acceptable and even specify designated “hard-avoid” areas that the system will actively process to reduce spill to a minimum - great for producing a quiet stage or for reducing noise pollution off-site at outdoor events.

The application is very straightforward to use taking you through a series of steps in a logical order. In fact it won’t allow you to attempt to design a system in the wrong order; steps need to be completed one after the other in the correct order making it very straightforward to design an array that will perform to its maximum potential.



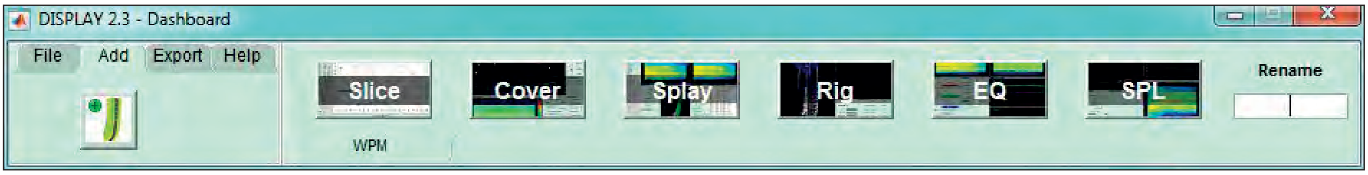
DISPLAY opens with a Dashboard at the top of the screen the initial view prompting you to specify your array which is the first step of the design process. WPM or WPC are available along with the Multicellular family of products. You next specify how your array will be deployed, flown, ground stacked or pole mounted (WPM only), specify the number of cabinets and give the array a name.



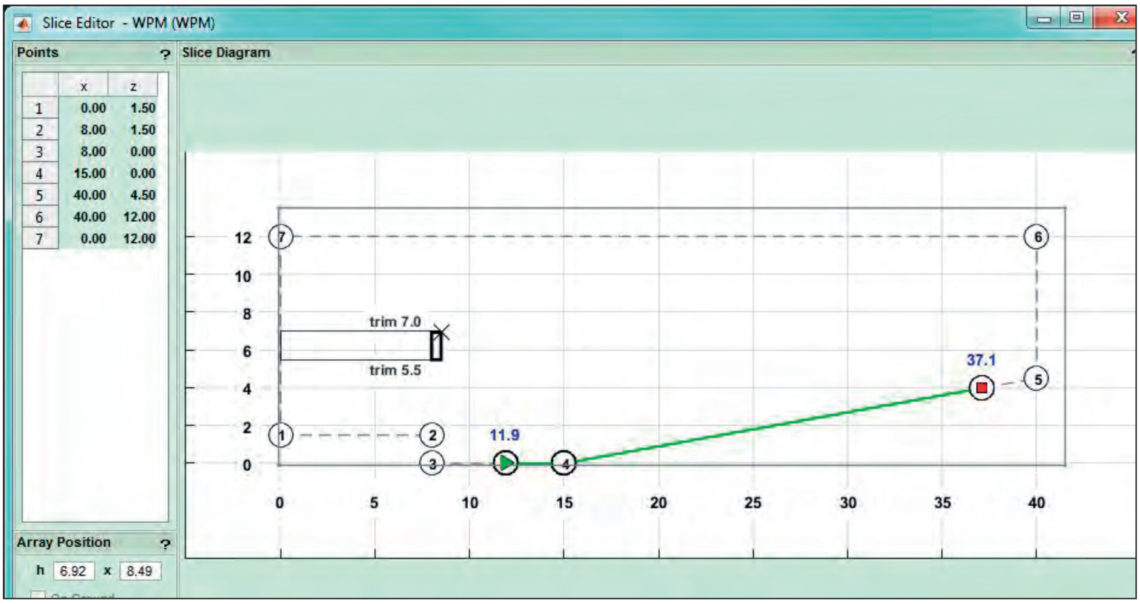
Array Type: WPM

Deployment: None

The dashboard changes to show the tabs from left and right in the order in which the design will be completed.



First a 2D slice of the venue is created, the Coverage within the venue is specified, the splay angles calculated. A rigging report allows you to deploy the array and whilst that is being done the EQ coefficients are calculated. Finally an SPL report gives detailed information showing exactly how the system will perform. The computer model is accurate to within +/- 1dB of actual measured results so the spl tab is a reliable overview of how well your system design will cover the space.


Slice Editor - WPM (WPM)
Slice Diagram
trim 7.0
trim 5.5
11.9
37.1
1
2
3
4
5
6
7
0
2
4
6
8
10
12
0
5
10
15
20
25
30
35
40

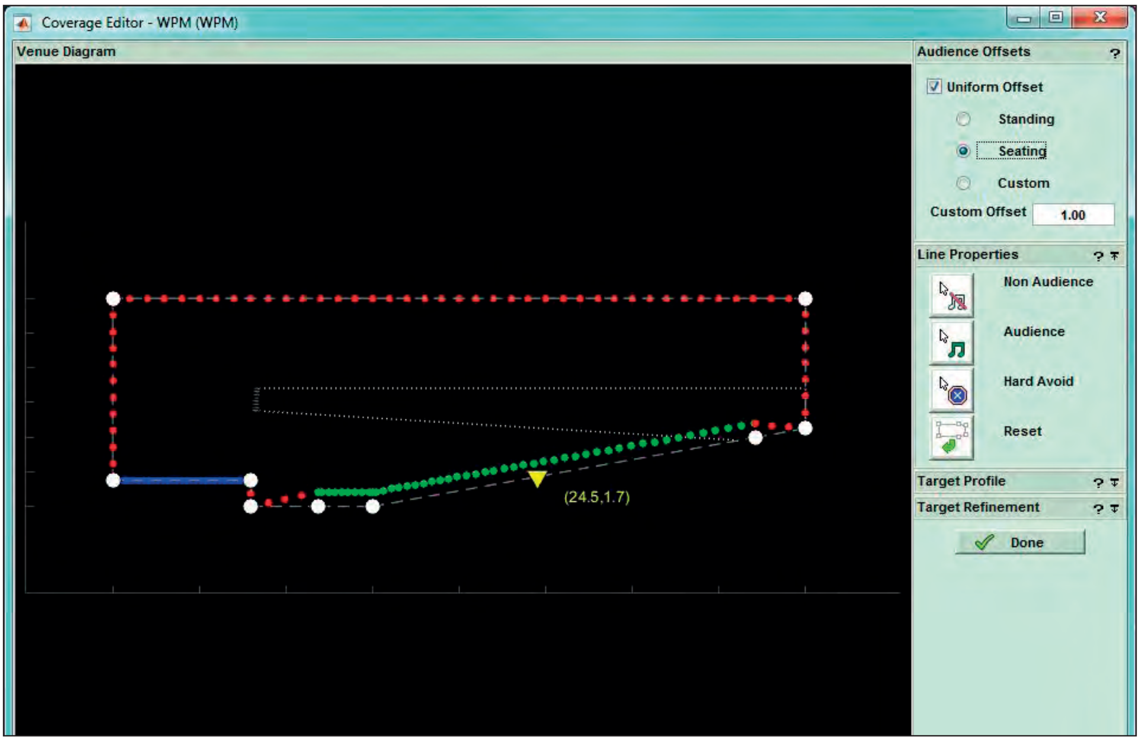
Points

	x	z
1	0.00	1.50
2	8.00	1.50
3	8.00	0.00
4	15.00	0.00
5	40.00	4.50
6	40.00	12.00
7	0.00	12.00

Array Position

h 6.92 x 8.49

The 2D slice is either drawn from scratch or you can also import a shell drawing from a previous project if you are working in a venue you have visited previously. The slice is a side view of the venue. It is drawn anticlockwise starting at the back of the stage and clicking to define the position of vertices that define all of the planes within the venue. This doesn't have to be done accurately as you can refine the precise position of the points working from architects drawings or measurements you have taken yourself. The array is positioned and the audience region specified from start to finish.


Coverage Editor - WPM (WPM)
Venue Diagram
(24.5,1.7)
Line Properties
Non Audience
Audience
Hard Avoid
Reset
Target Profile
Target Refinement
Done

Audience Offsets

☑ Uniform Offset

○ Standing

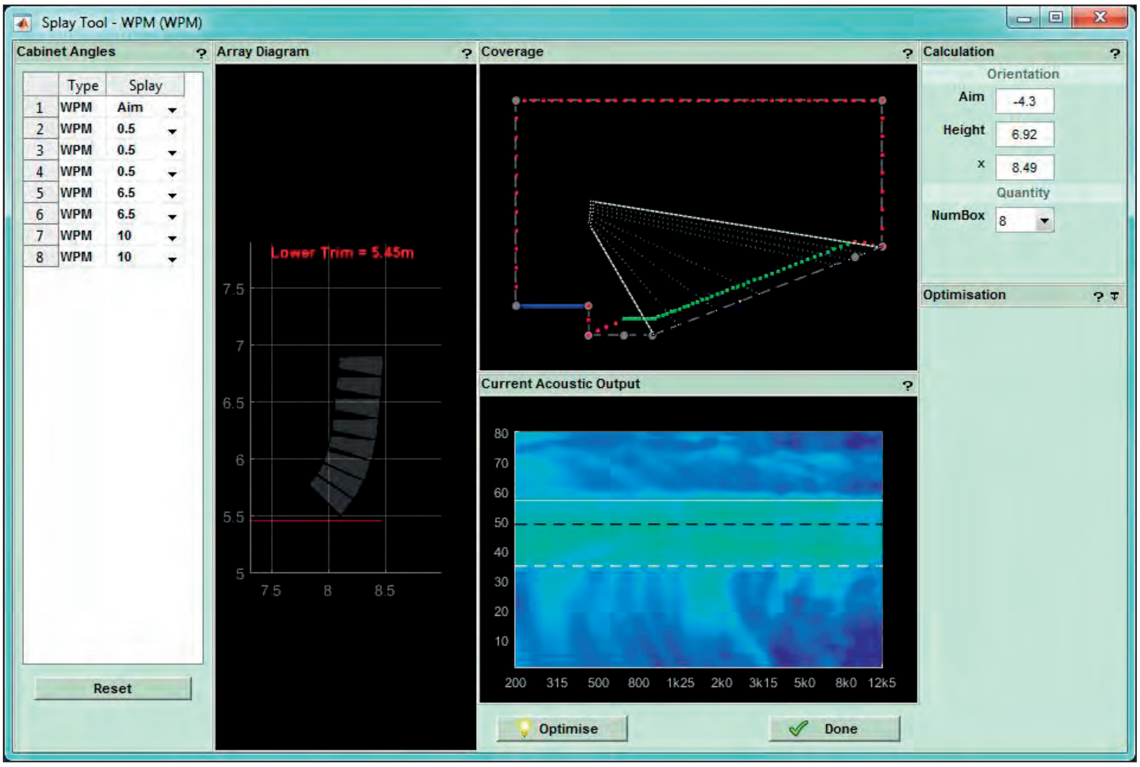
● Seating

○ Custom

Custom Offset 1.00

The coverage tab shows your 2D model with the planes refined into three types;-audience in green, non-audience in red and hard avoid in blue. Each dot represents a virtual microphone position at which the software will take response measurements using the integral computer model. The dots in the critical audience region are closer together for greater accuracy and are spaced closer together at the start of the audience region to mirror how each region is covered by sections of the array. The audience offset can be edited; standing, sitting or a custom offset of your choice and each region can be edited, perhaps changing a section under a balcony from audience to non-audience for example.

The spl profile can be modified and the environmental conditions entered to allow the optimisation to compensate for air absorption, particularly critical for outdoor events.

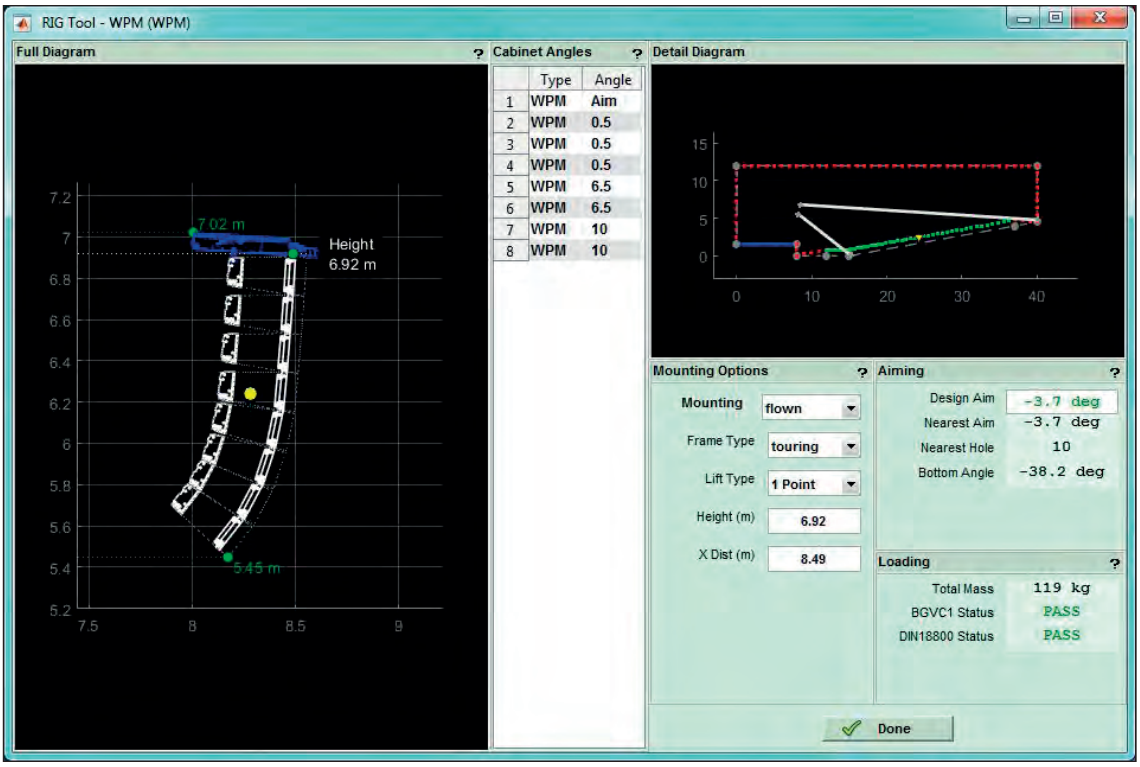

Splay Tool - WPM (WPM)
Cabinet Angles
Array Diagram
Coverage
Calculation
Orientation
Quantity
Optimisation
Current Acoustic Output
7.5
7
6.5
6
5.5
5
7.5
8
8.5
80
70
60
50
40
30
20
10
200
315
500
800
1k25
2k0
3k15
5k0
8k0
12k5
Reset
Optimise
Done

	Type	Splay
1	WPM	Aim
2	WPM	0.5
3	WPM	0.5
4	WPM	0.5
5	WPM	6.5
6	WPM	6.5
7	WPM	10
8	WPM	10

Lower Trim = 5.45m

Aim -4.3
Height 6.92
x 8.49
NumBox 8

In the splay tab you can refine the quantity and position of the array before the system optimises the inter-cabinet splay angles and the “aim” angle for the flying grid.


RIG Tool - WPM (WPM)
Full Diagram
Cabinet Angles
Detail Diagram
7.02 m
Height
6.92 m
5.45 m
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
7.5
8
8.5
9
15
10
5
0
0
10
20
30
40
Done

	Type	Angle
1	WPM	Aim
2	WPM	0.5
3	WPM	0.5
4	WPM	0.5
5	WPM	6.5
6	WPM	6.5
7	WPM	10
8	WPM	10

Mounting Options

Mounting: flown
Frame Type: touring
Lift Type: 1 Point
Height (m): 6.92
X Dist (m): 8.49

Aiming

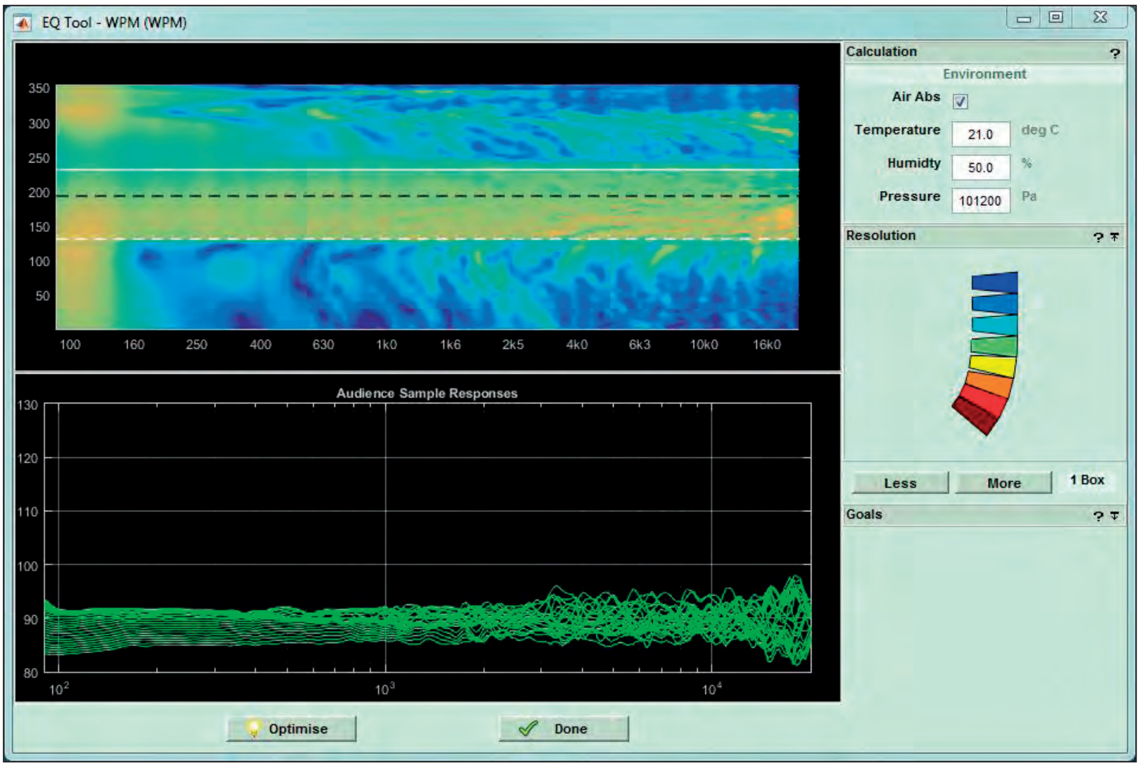
Design Aim: -3.7 deg
Nearest Aim: -3.7 deg
Nearest Hole: 10
Bottom Angle: -38.2 deg

Loading

Total Mass: 119 kg
BGVC1 Status: PASS
DIN18800 Status: PASS

Once this is complete you can further refine how the array is to be deployed in the Rig tab; choosing for example between a 2 point hang and a single point for which the application will display the best position on the flying frame to give the nearest angle to the optimised aim. The actual physical angle that the specified hole in the frame will give will be displayed with the option to use this angle in the optimisation so that the array EQ is optimised for the actual physical position in which the array is installed.

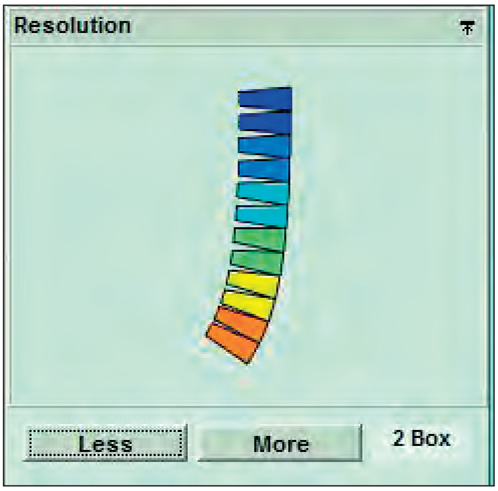
Finally the load on each flying point is shown and critically the Rig tab shows if the array is safe and meets both BGVC1 and DIN18800 standards.


EQ Tool - WPM (WPM)
350
300
250
200
150
100
50
100
160
250
400
630
1k0
1k6
2k5
4k0
6k3
10k0
16k0
Audience Sample Responses
130
120
110
100
90
80
10^2
10^3
10^4
Calculation
Resolution
Less
More
1 Box
Goals
Optimise
Done

Environment

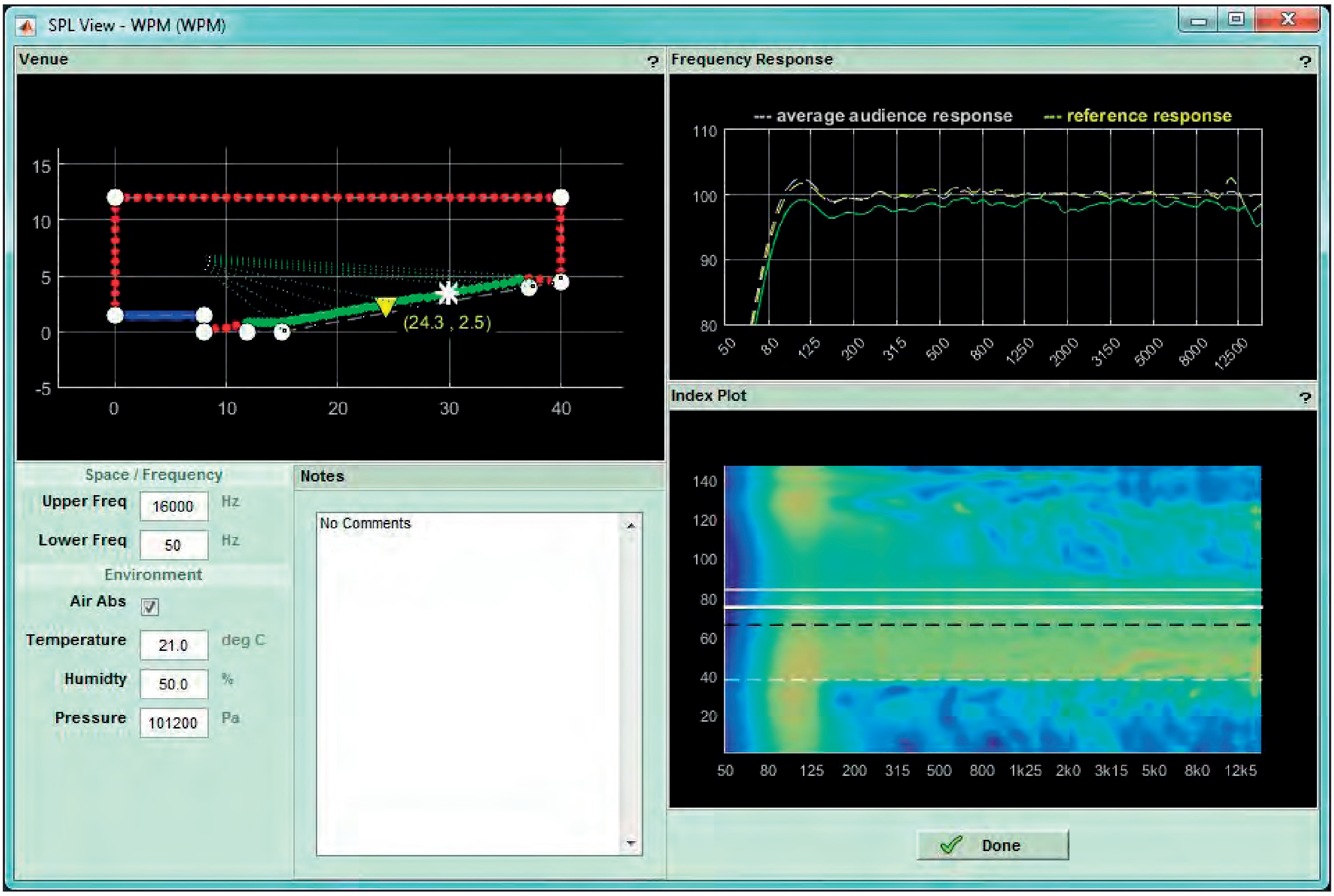
Air Abs: ☑
Temperature: 21.0 deg C
Humidty: 50.0 %
Pressure: 101200 Pa

With the physical deployment underway you can progress to optimise the EQ. Again you can enter the environmental conditions and can balance the three goals of response in your audience region, leakage to non-audience and the hard avoid performance. By default each are given equal importance but if your application demands particular emphasis on any one of these parameters they can be given greater importance.


Resolution
Less
More

2 Box

The Resolution is entered either 1 to 4 box for WPM or 1 to 3 box for WPC.


SPL View - WPM (WPM)
Venue
15
10
5
0
-5
0
10
20
30
40
(24.3 , 2.5)
Frequency Response
--- average audience response
--- reference response
110
100
90
80
50
80
125
200
315
500
800
1250
2000
3150
5000
8000
12500
Index Plot
140
120
100
80
60
40
20
50
80
125
200
315
500
800
1k25
2k0
3k15
5k0
8k0
12k5
Space / Frequency
Environment
Notes
Done

Upper Freq 16000 Hz

Lower Freq 50 Hz

Air Abs ☑

Temperature 21.0 deg C

Humidty 50.0 %

Pressure 101200 Pa

No Comments

The Spl tab shows the system performance. The entire venue spl is displayed on an index plot with frequency along the horizontal axis and position within the venue along the vertical. Spl is indicated with colour, blue being quietest moving through the colour spectrum to red which is the loudest. You can move the cursor around the Index Plot and the position is shown on the 2D slice of the venue top left whilst showing the frequency response at that position on the graph on the right.

The final stage is to export your design. You can produce a printable rigging report, a wire-frame 3D model of the array, export 3D data for use with EASE and most importantly export the project as a D2P file which can be uploaded directly to an iKon amplifier for powering Wavefront Precision systems.

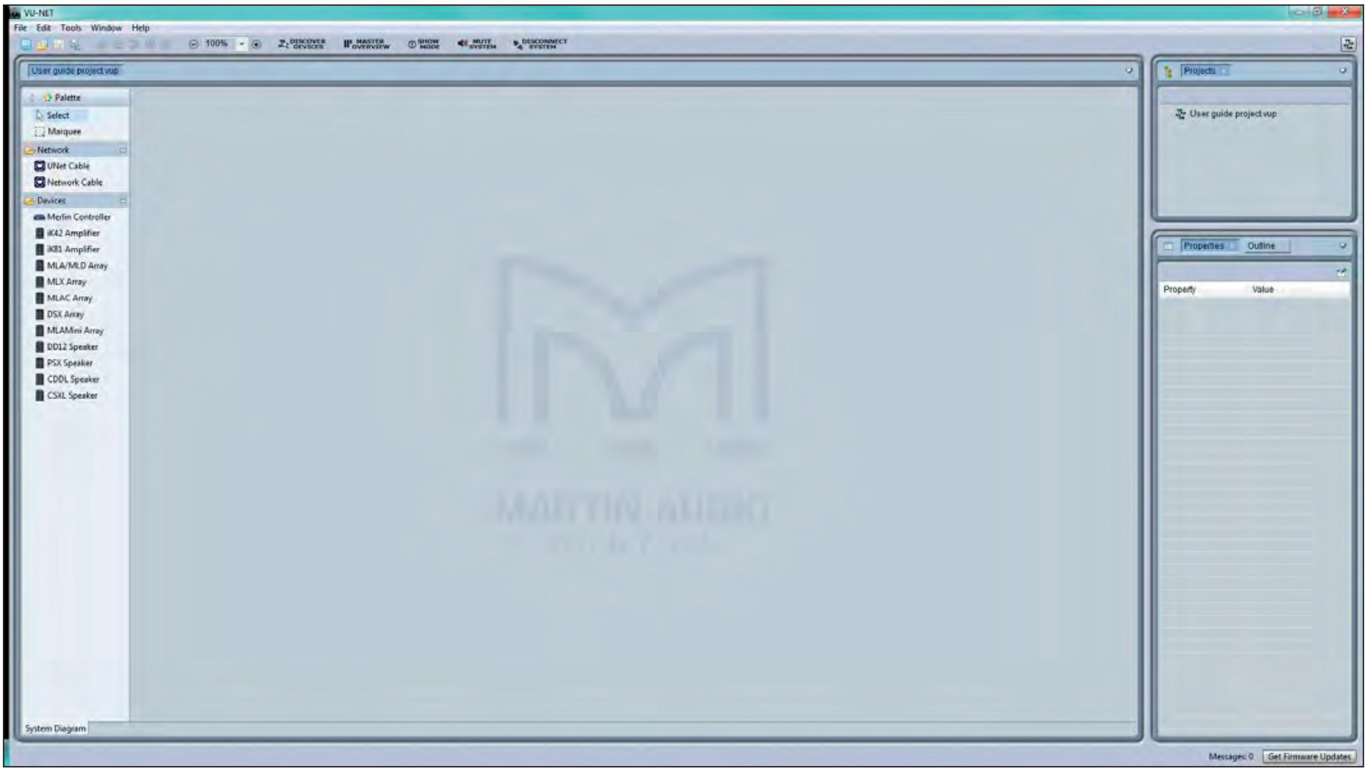
DISPLAY 2.3 can be downloaded from the Martin audio website here:- https://martin-audio.com/support/software. There is also a comprehensive User Guide to take you through the design process in detail. We strongly recommend downloading the User Guide to fully understand the application.

Vu-Net 2.1 Overview

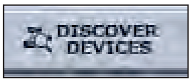
Vu-Net is Martin Audio's application which is used to connect to iKon amplifiers and a growing number of products including the MLA family, CDD-Live, PSX and DD12. This makes it possible to create a system with products from several different ranges and control and monitor them from a single software platform.

Connection to iKon amplifiers is made over a standard Ethernet network using off the shelf networking products so remote access to control Wavefront Precision systems is extremely straightforward. Complex systems with large numbers of amplifiers can easily be created using standard network switches, the system by default is configured with dynamic IP addressing so DHCP support will be required however a static IP configuration is also easily enabled.

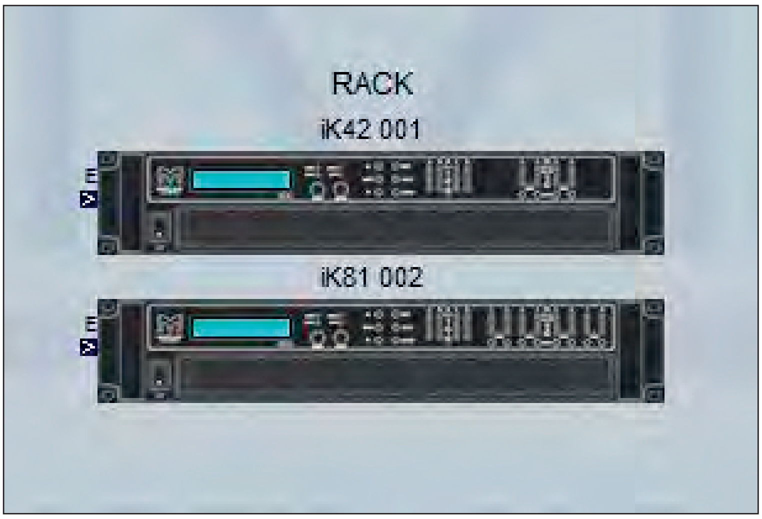
Vu-Net is used to upload the presets created using DISPLAY 2.3 into the amplifiers which will automatically create a thumbnail of the Wavefront Precision array that has been designed. Once the array has been created, all of the amplifier functions are available for control to make any changes you may need to routing, crossover point, phase, delay or system EQ. The application has an intuitive GUI making is very quick and easy to get to grips with if you have used any computer based processing software. Once the system is configured the amplifiers can be kept on-line to give comprehensive monitoring of the system performance.


VU-NET
File
Edit
Tools
Window
Help
100%
DISCOVER DEVICES
MASTER OVERVIEW
SHOW MODE
MUTE SYSTEM
DISCONNECT SYSTEM
User guide project.vup
Palette
Select
Marquee
Network
UNet Cable
Network Cable
Devices
Merlin Controller
iK42 Amplifier
iK81 Amplifier
MLA/MLD Array
MLX Array
MLAC Array
DSX Array
MLAMini Array
DD12 Speaker
PSX Speaker
CDDL Speaker
CSXL Speaker
System Diagram
Projects
User guide project.vup
Properties
Outline
Property
Value
Messages: 0
Get Firmware Updates

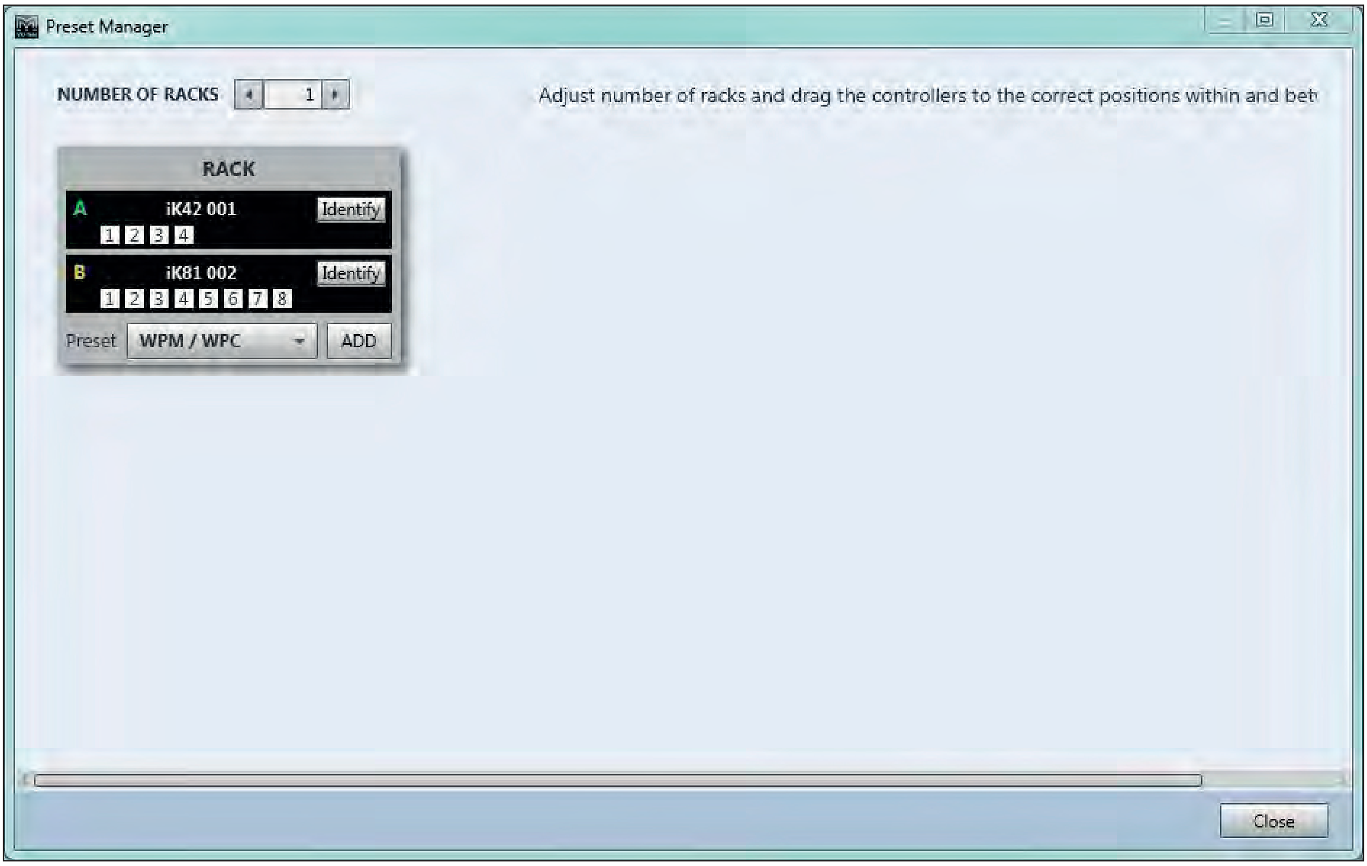
The application opens with a blank System diagram. It is possible to add products manually using the Palette on the left but this has limited use, in practical applications, the Discover Devices button is used.


DISCOVER DEVICES

The application searches the network for all Vu-Net enabled devices and will run an installation wizard to add them to the Vu-Net project.


RACK
iK42 001
iK81 002

The next stage is to right click on the amplifiers to access the Preset Manager.

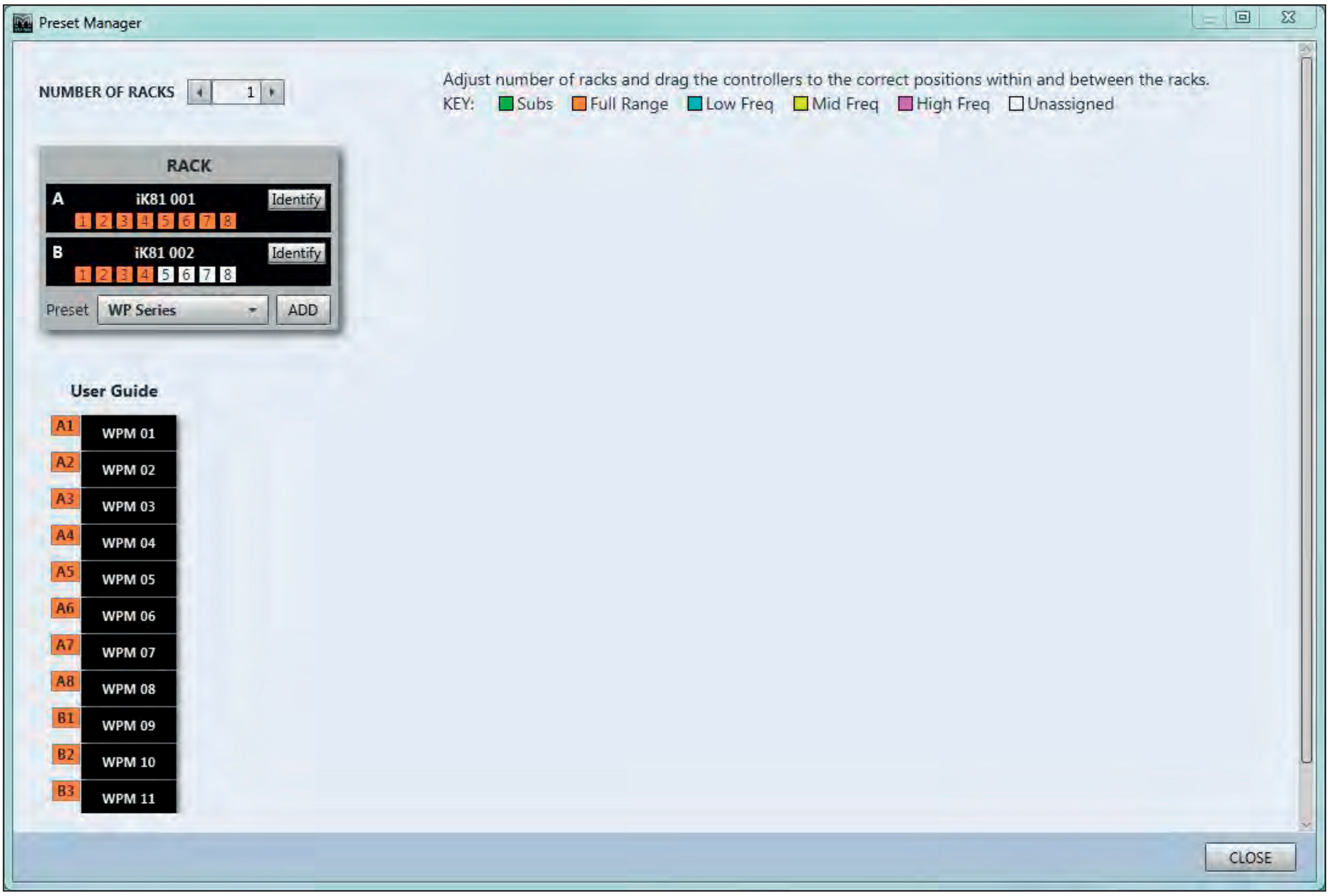

Preset Manager
RACK
A
iK42 001
Identify
1 2 3 4
B
iK81 002
Identify
1 2 3 4 5 6 7 8
ADD
Close

NUMBER OF RACKS 1

Adjust number of racks and drag the controllers to the correct positions within and bet

Preset WPM / WPC

From here the system allows you up upload the D2P file of your system design.



NUMBER OF RACKS 1

Adjust number of racks and drag the controllers to the correct positions within and between the racks.
KEY: 🟩 Subs 🟧 Full Range 🟦 Low Freq 🟨 Mid Freq 🟪 High Freq ☐ Unassigned

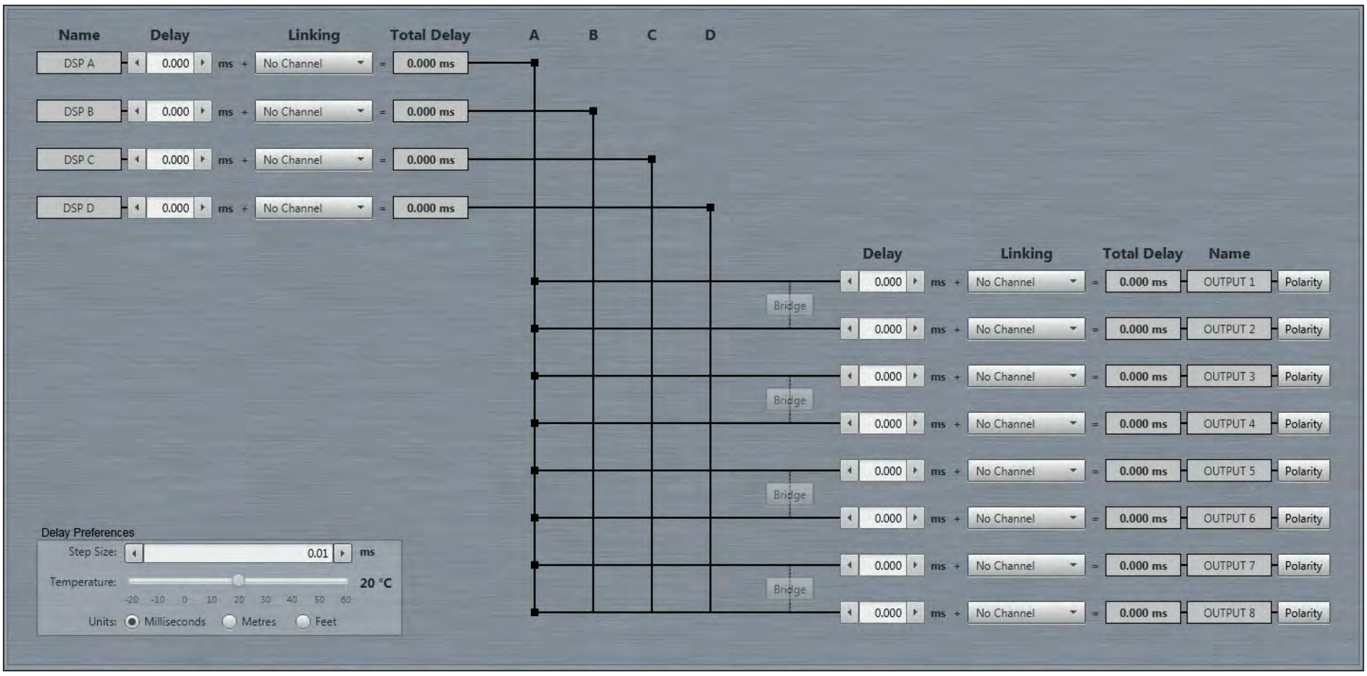
A iK81 001 1 2 3 4 5 6 7 8
B iK81 002 1 2 3 4 5 6 7 8

Preset: WP Series

User Guide

A1	WPM 01
A2	WPM 02
A3	WPM 03
A4	WPM 04
A5	WPM 05
A6	WPM 06
A7	WPM 07
A8	WPM 08
B1	WPM 09
B2	WPM 10
B3	WPM 11

You can now return to the project system diagram, double click on the amplifiers and edit the system to suit your application, perhaps adding some delay to align subwoofers.

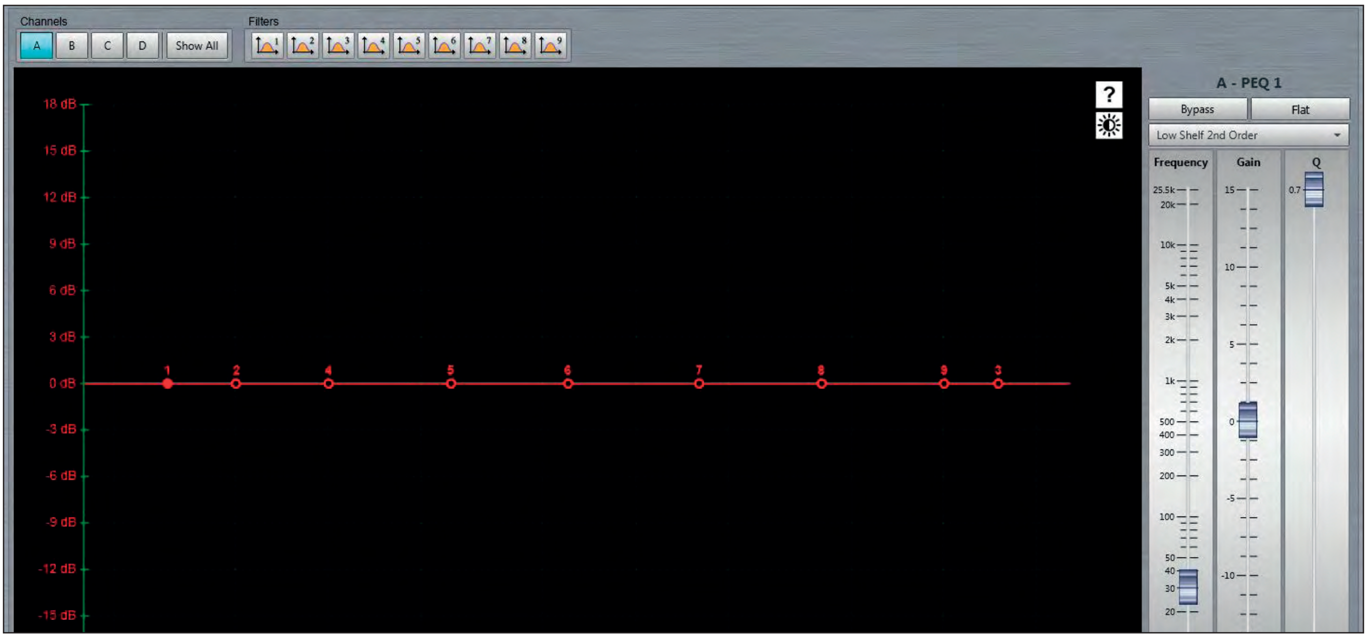


Name	Delay	Linking	Total Delay
DSP A	0.000 ms	No Channel	0.000 ms
DSP B	0.000 ms	No Channel	0.000 ms
DSP C	0.000 ms	No Channel	0.000 ms
DSP D	0.000 ms	No Channel	0.000 ms

Delay	Linking	Total Delay	Name
0.000 ms	No Channel	0.000 ms	OUTPUT 1
0.000 ms	No Channel	0.000 ms	OUTPUT 2
0.000 ms	No Channel	0.000 ms	OUTPUT 3
0.000 ms	No Channel	0.000 ms	OUTPUT 4
0.000 ms	No Channel	0.000 ms	OUTPUT 5
0.000 ms	No Channel	0.000 ms	OUTPUT 6
0.000 ms	No Channel	0.000 ms	OUTPUT 7
0.000 ms	No Channel	0.000 ms	OUTPUT 8

Delay Preferences
Step Size: 0.01 ms
Temperature: 20 °C
Units: ● Milliseconds ○ Metres ○ Feet

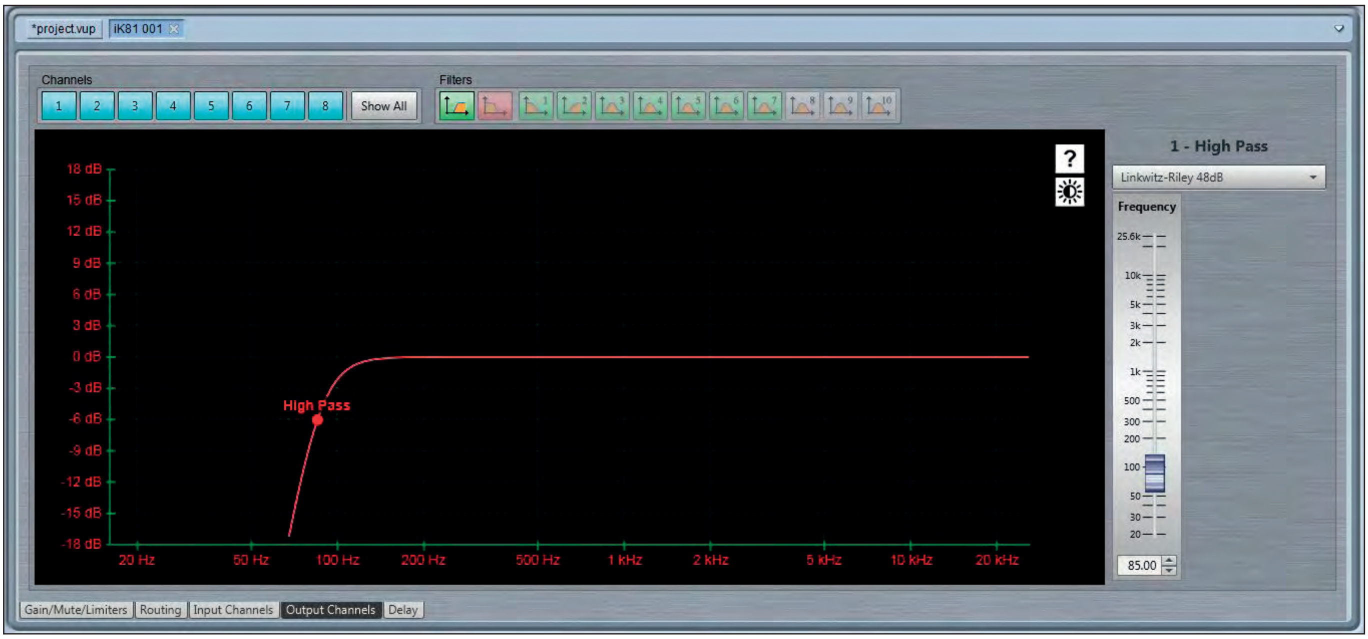
Input EQ can be adjusted to suit your preferences and to compensate for any difficult acoustics.


A - PEQ 1

Low Shelf 2nd Order

Channels
A
B
C
D
Show All
Filters
Bypass
Flat
Frequency
Gain
Q
18 dB
15 dB
12 dB
9 dB
6 dB
3 dB
0 dB
-3 dB
-6 dB
-9 dB
-12 dB
-15 dB
1
2
4
5
6
7
8
9
3

The output EQ is greyed out as it is used to apply the EQ created by your DISPLAY project, however the high pass filter is available for adjustment so you can determine the crossover point between the WPM array and your subwoofers.

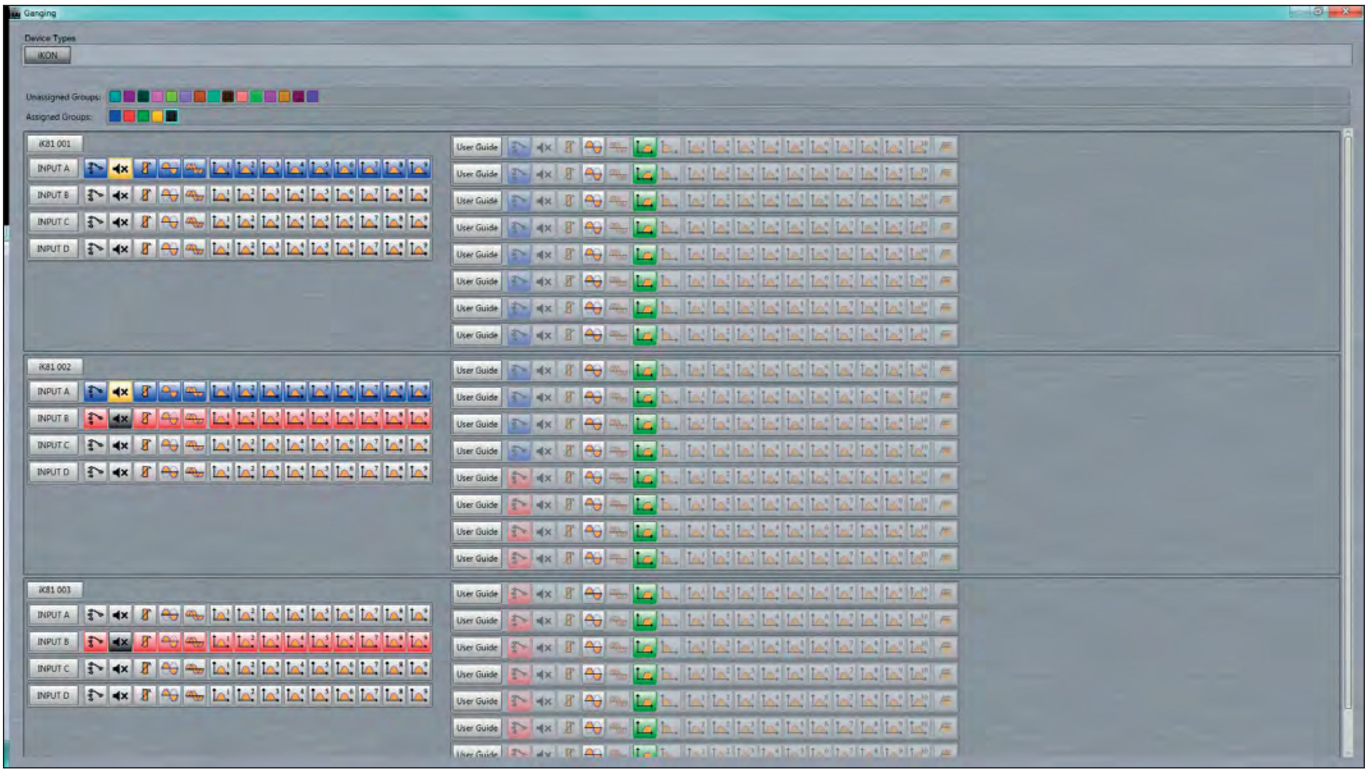

1 - High Pass

Linkwitz-Riley 48dB

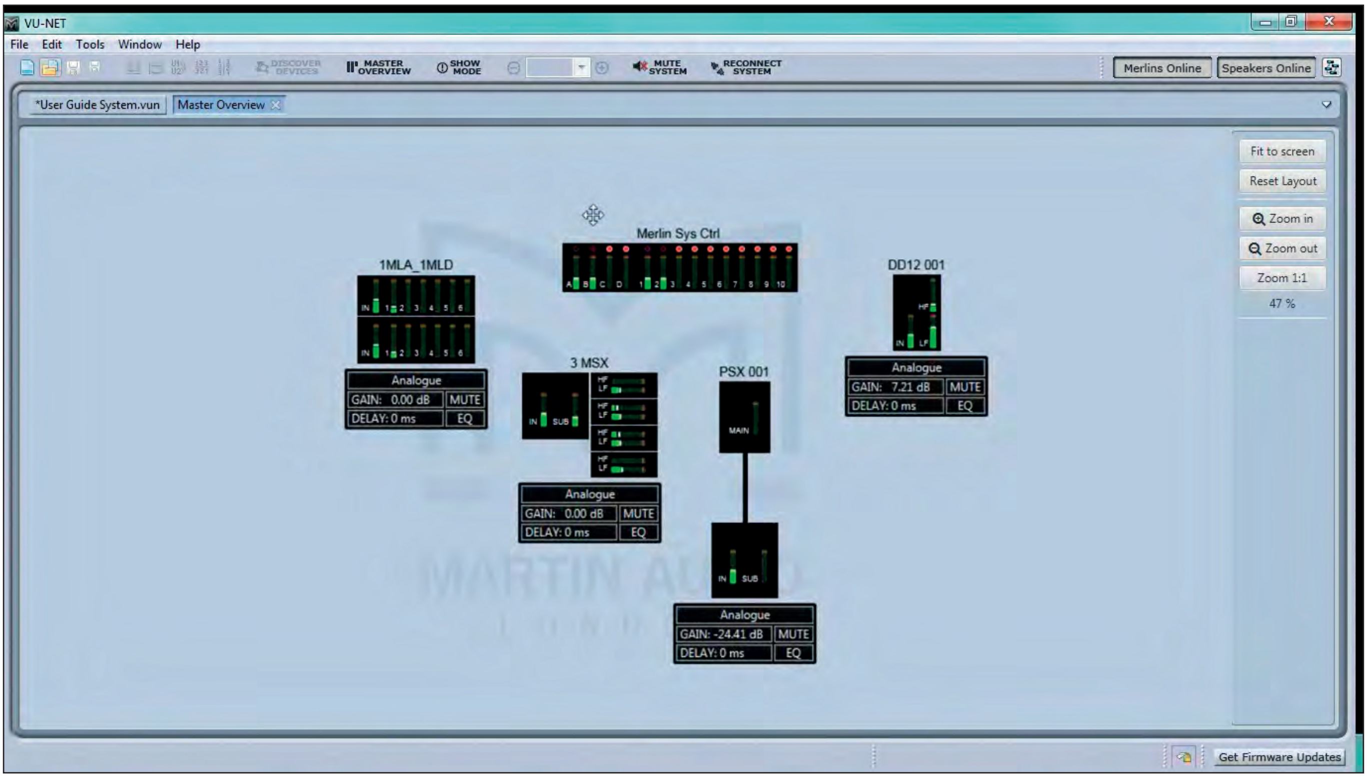
Frequency: 85.00

*project.vup
iK81 001
Channels
1
2
3
4
5
6
7
8
Show All
Filters
18 dB
15 dB
12 dB
9 dB
6 dB
3 dB
0 dB
-3 dB
-6 dB
-9 dB
-12 dB
-15 dB
-18 dB
High Pass
20 Hz
50 Hz
100 Hz
200 Hz
500 Hz
1 kHz
2 kHz
5 kHz
10 kHz
20 kHz
Gain/Mute/Limiters
Routing
Input Channels
Output Channels
Delay

Comprehensive ganging is available so you can ensure that stereo arrays remain completely identical.


Ganging
Device Types
iKON
Unassigned Groups:
Assigned Groups:
iK81 001
INPUT A
INPUT B
INPUT C
INPUT D
User Guide
iK81 002
iK81 003

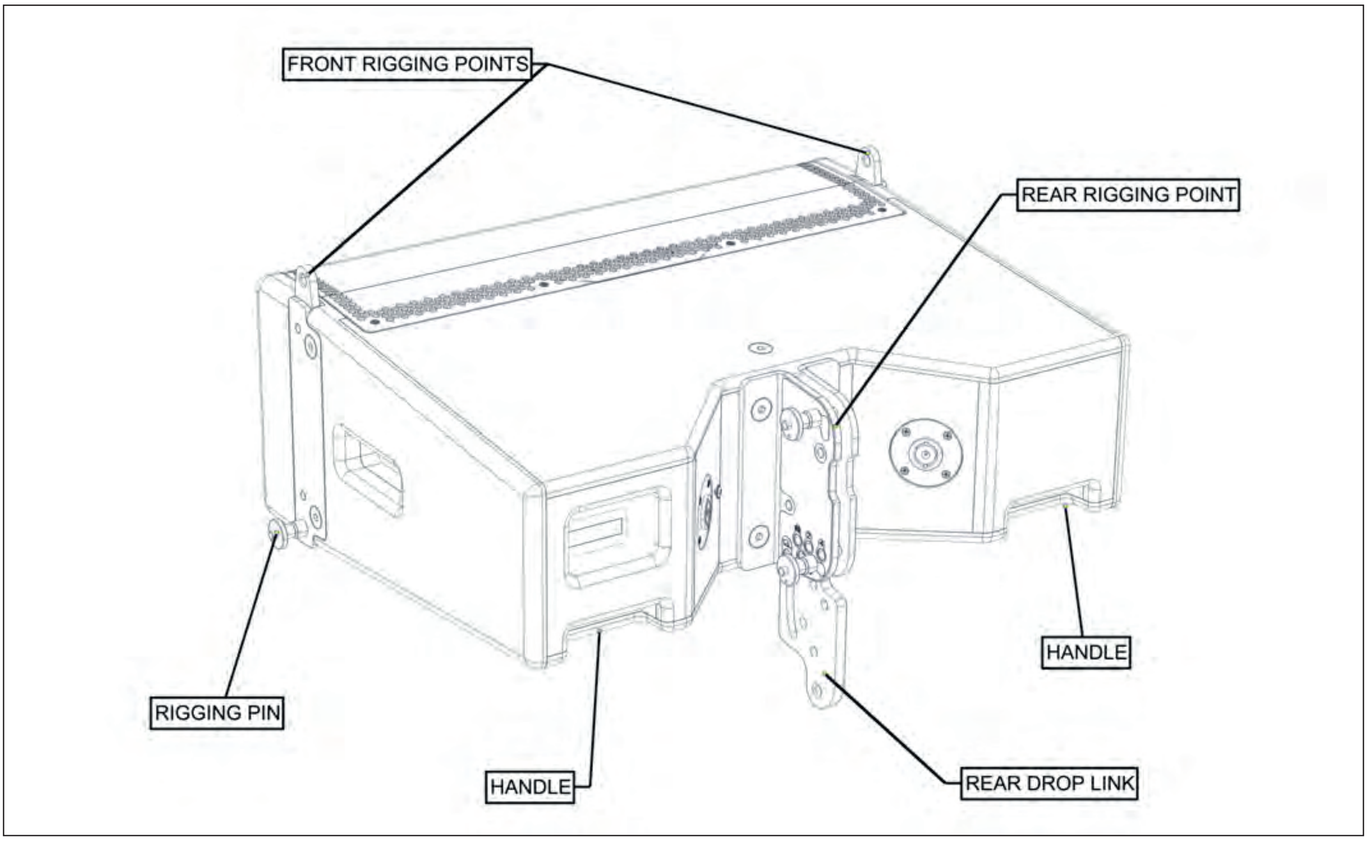
Once the system is configured to your satisfaction a Master Overview gives a complete picture of even the most complex system allowing you to monitor all metering and access commonly needed functions such as gain and mute.

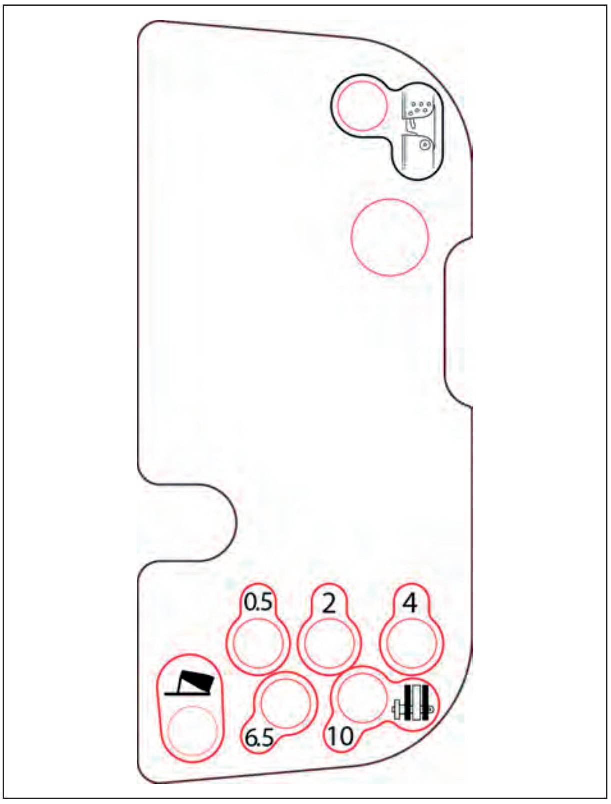

VU-NET
File
Edit
Tools
Window
Help
DISCOVER DEVICES
MASTER OVERVIEW
SHOW MODE
MUTE SYSTEM
RECONNECT SYSTEM
Merlins Online
Speakers Online
*User Guide System.vun
Master Overview
Fit to screen
Reset Layout
Zoom in
Zoom out
Zoom 1:1
47 %
Merlin Sys Ctrl
1MLA_1MLD
DD12 001
3 MSX
PSX 001
Analogue
GAIN: 0.00 dB
MUTE
DELAY: 0 ms
EQ
GAIN: 7.21 dB
GAIN: -24.41 dB
Get Firmware Updates

Vu-Net is a free download from the Software page of the Martin Audio website here; https://martin-audio.com/support/software

It is a comprehensive application with a host of functions to enable control and monitoring of almost every parameter of a system. For full details we would strongly recommend downloading the Vu-Net User Guide which can be found on the same page as the application download, this is an excellent reference to fully understand the use of Vu-Net.

Rigging WPM

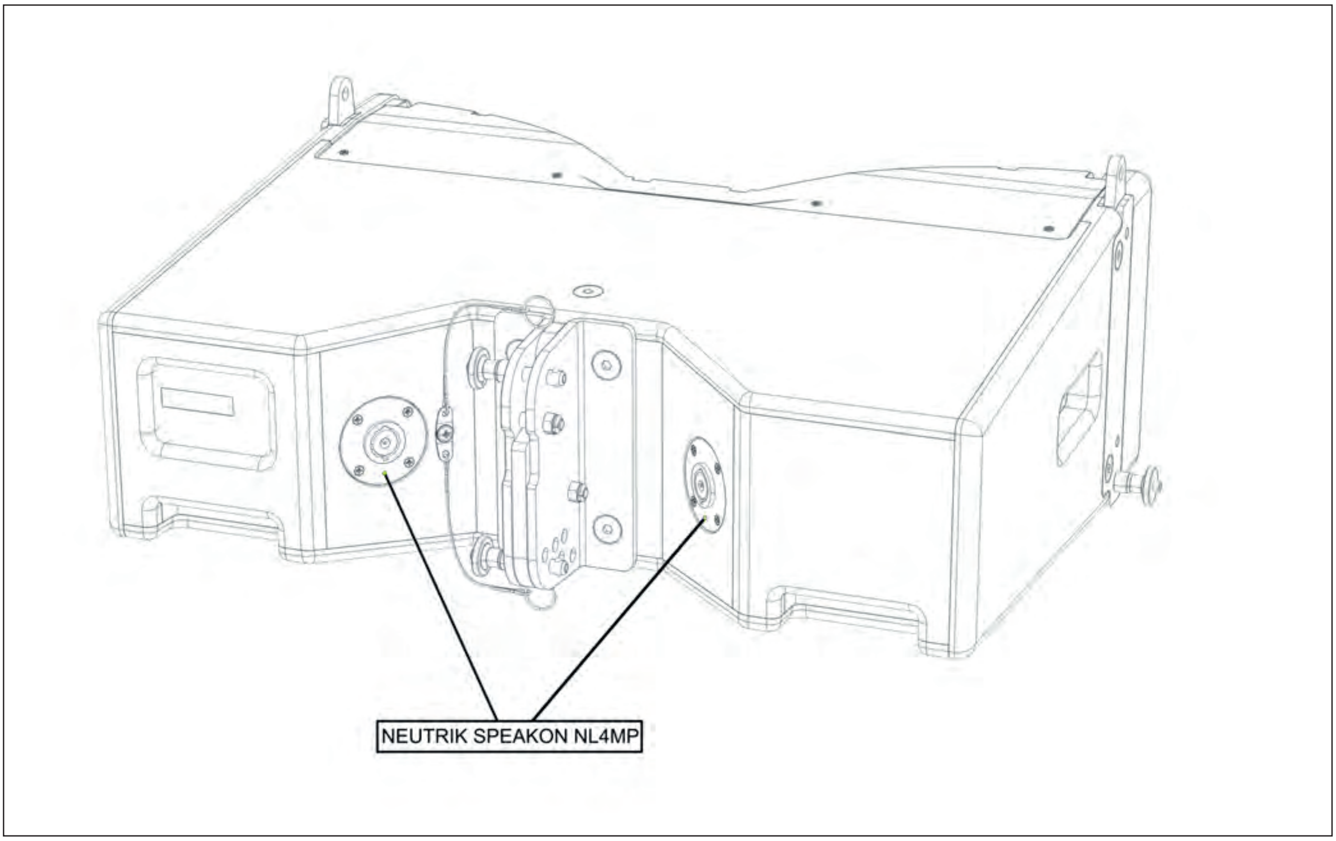

FRONT RIGGING POINTS
REAR RIGGING POINT
HANDLE
RIGGING PIN
HANDLE
REAR DROP LINK



WPM’s three-point rigging system consists of two rigging points at the front and a single rigging point at the rear of the cabinet. The rear sliding drop down link is equipped with a single point at the top for attaching to cabinets above it, five rigging holes labeled for 0.5°, 2°, 4°, 6.5° and 10° inter-cabinet angles, as well as a rigging hole for use when assembling ground stacked arrays.

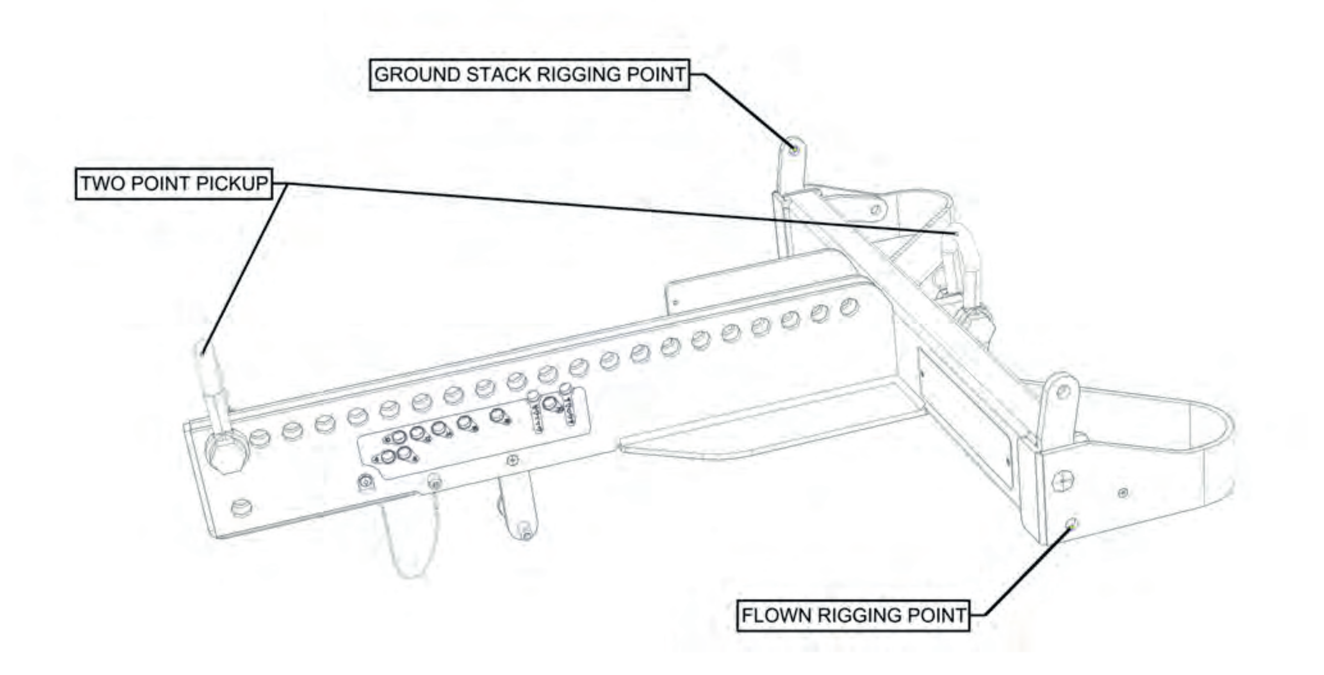
WPM Connections

The WPM has two parallel-wired Neutrik® NL4 connectors on angled panels at the rear of the cabinet, recessed to avoid damage. Connect speaker cables here, taking care to observe the colour coding of the connectors.



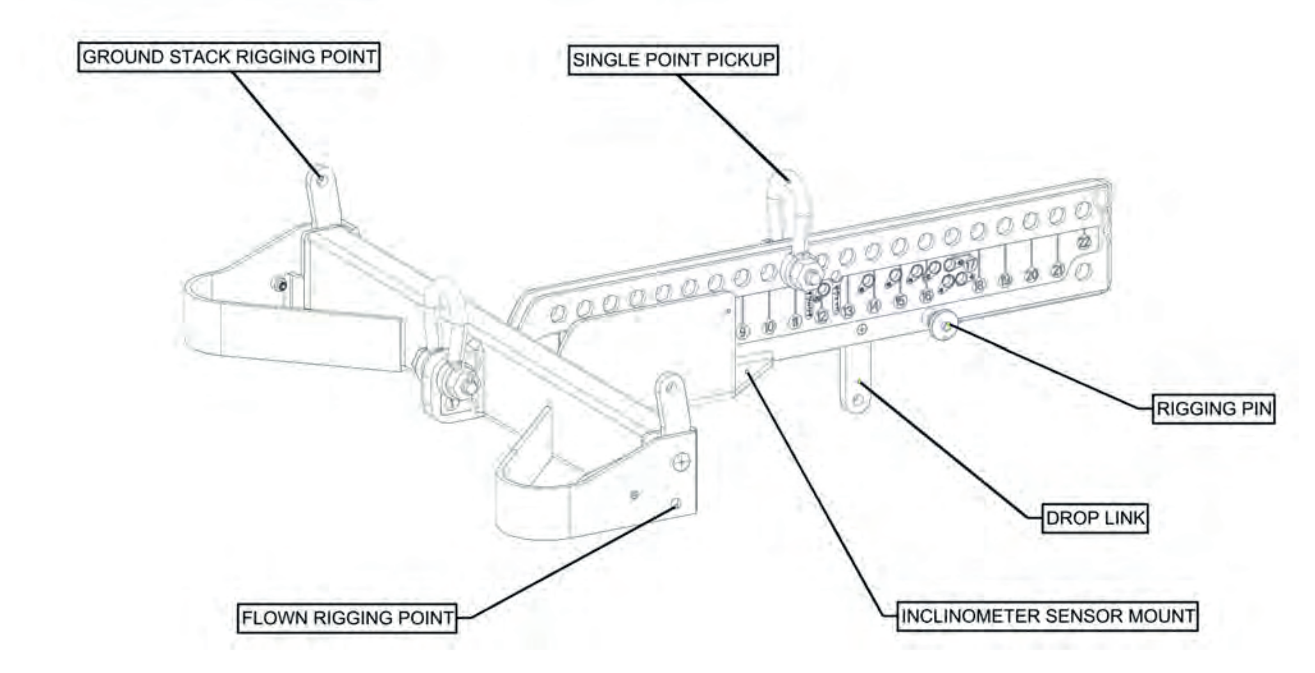
The two NL4s are wired in parallel so either can be used as a nominal 'input' or 'link' output. When the system is configured for a single box resolution system each cabinet is connected to a single amplifier channel. In two box or higher resolution, connection is made from an amplifier channel to the 'input' of one cabinet and the second 'link' NL4 is used to make a parallel connection to an adjacent cabinet. The maximum is 4 box resolution with four cabinets connected to a single amplifier channel. Connection goes to one cabinet with links between the three cabinets below in daisy-chain fashion going from link out to input on the next cabinet.

WPMGRIDt Touring Flying Frame

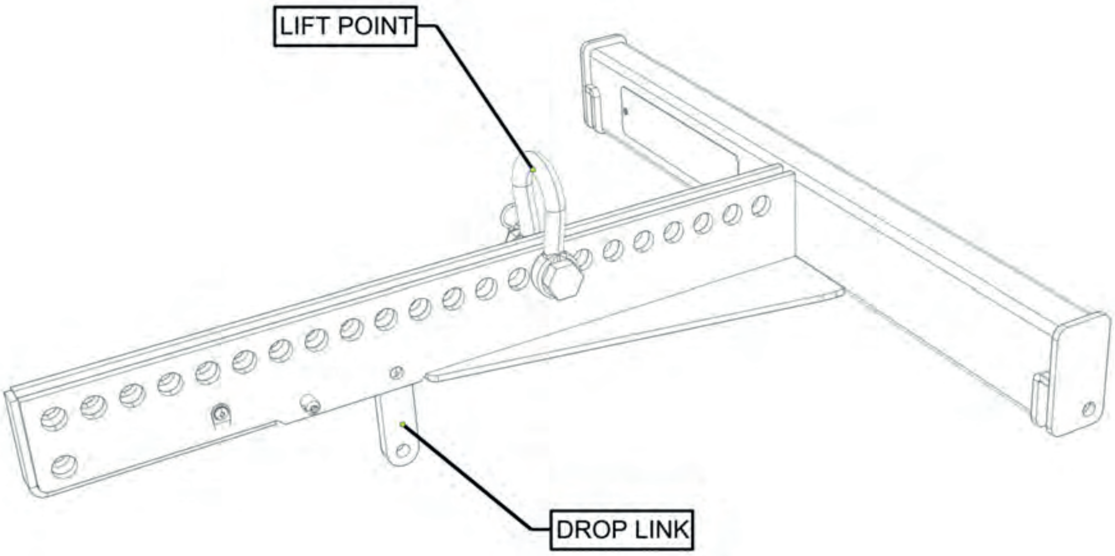

GROUND STACK RIGGING POINT
TWO POINT PICKUP
FLOWN RIGGING POINT

The Touring Flying Frame is a comprehensively featured flybar designed to meet BGVC1 and DIN18800 standards, and capable of lifting up to a maximum of 16 WPM cabinets using either one or two lift points, allowing both positive (up-tilt) and negative (down-tilt) array tilt angles.

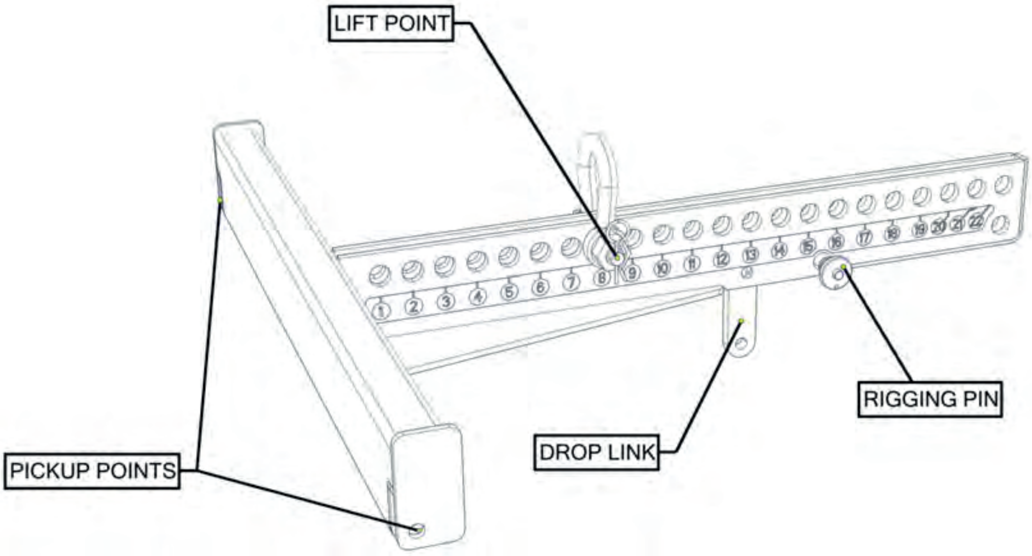
An inclinometer is available for use with the Touring Flying Frame which checks the angle at which the WPM array is flown at (relative to the horizontal). It consists of a sensor part number ASM20017 (mounted within the Flying Frame, one required per grid) and a remote display unit part number ASM20019. Interconnection is via a standard XLR mic cable.


GROUND STACK RIGGING POINT
SINGLE POINT PICKUP
RIGGING PIN
DROP LINK
FLOWN RIGGING POINT
INCLINOMETER SENSOR MOUNT

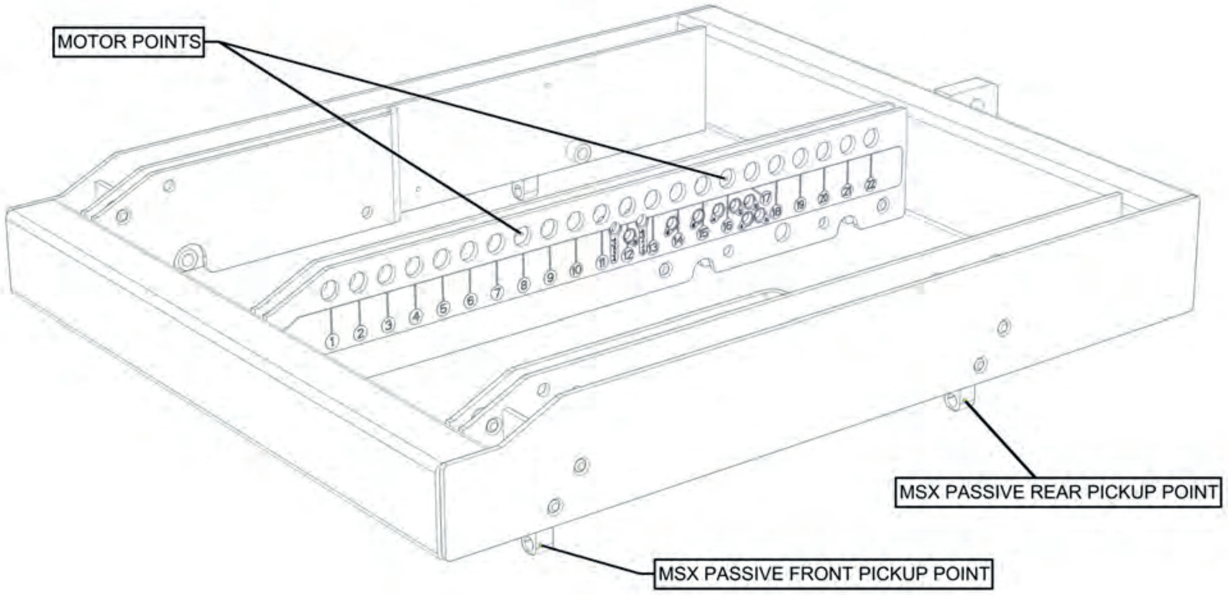
WPMGRIDi Install Flying Frame


LIFT POINT
DROP LINK

The Install Flying Frame provides a cost effective rigging solution and simplicity of operation for permanently flown installations. It is designed to meet BGVC1 and DIN18800 standards, and will lift a maximum of 16 WPM cabinets using either two lift points or a single lift point, in which case the lift point position is determined by the Martin Audio DISPLAY software.

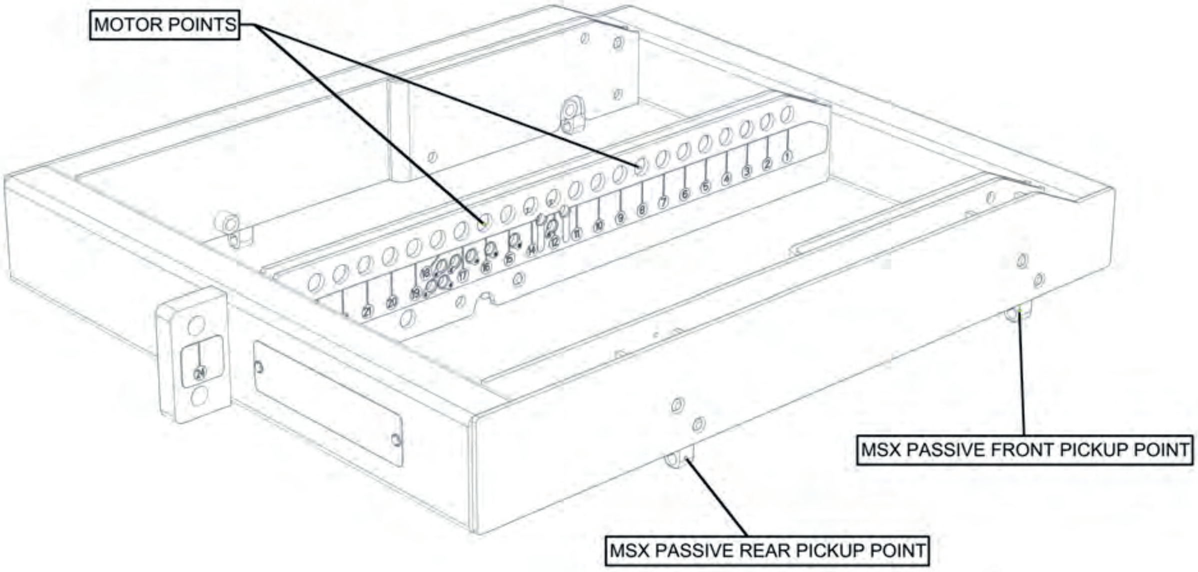

LIFT POINT
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
RIGGING PIN
DROP LINK
PICKUP POINTS

MLA Mini Flying Frame

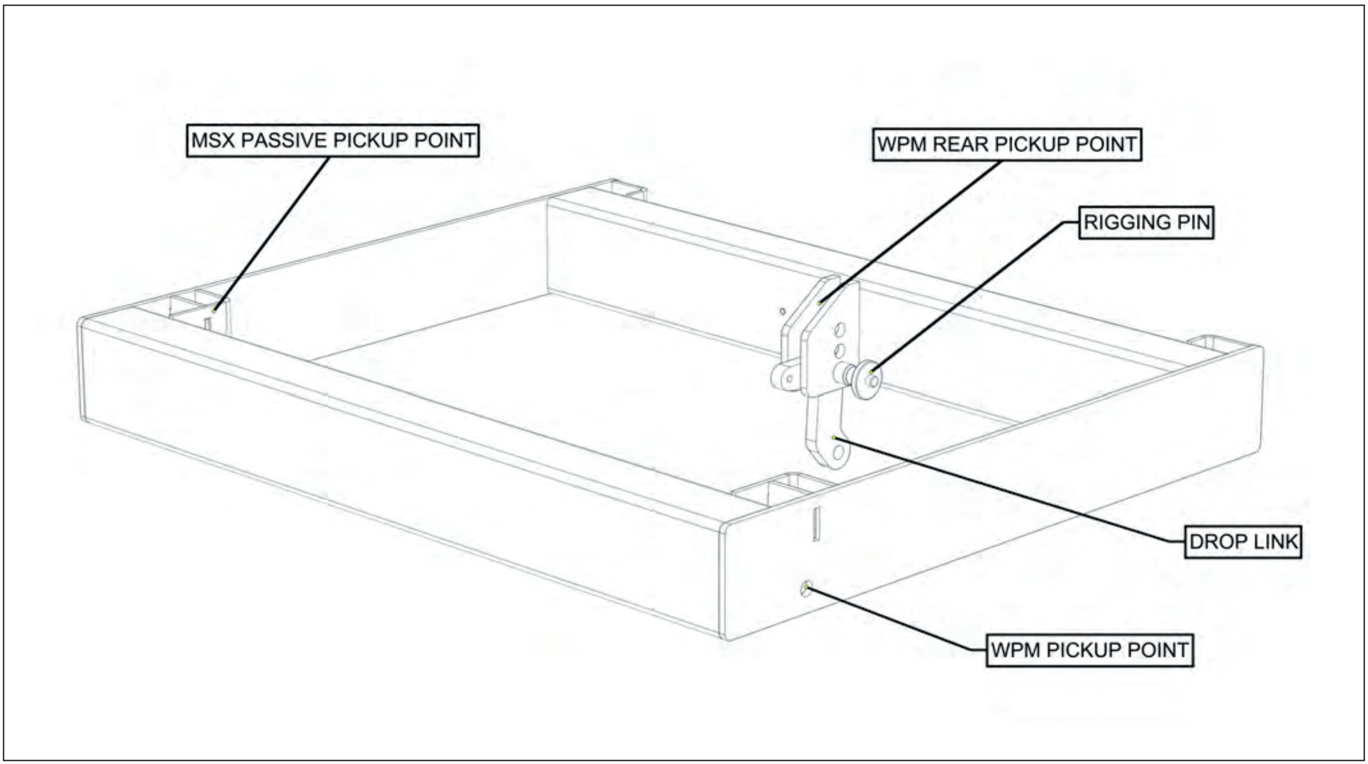

MOTOR POINTS
MSX PASSIVE REAR PICKUP POINT
MSX PASSIVE FRONT PICKUP POINT

The MLA Mini Flying Frame is used as the main Flying Frame for flown MSX Passive subwoofers, or flown arrays of WPM cabinets and MSX Passive subwoofers, and it can be used with either one or two chain hoists. It provides a four-point rigging system for MSX Passive subwoofers and will support a total of eight cabinets. The central spine offers a total of 22 numbered motor points. Four MSX Passive subwoofer pickup points are provided on the underside of the frame at the front and rear.

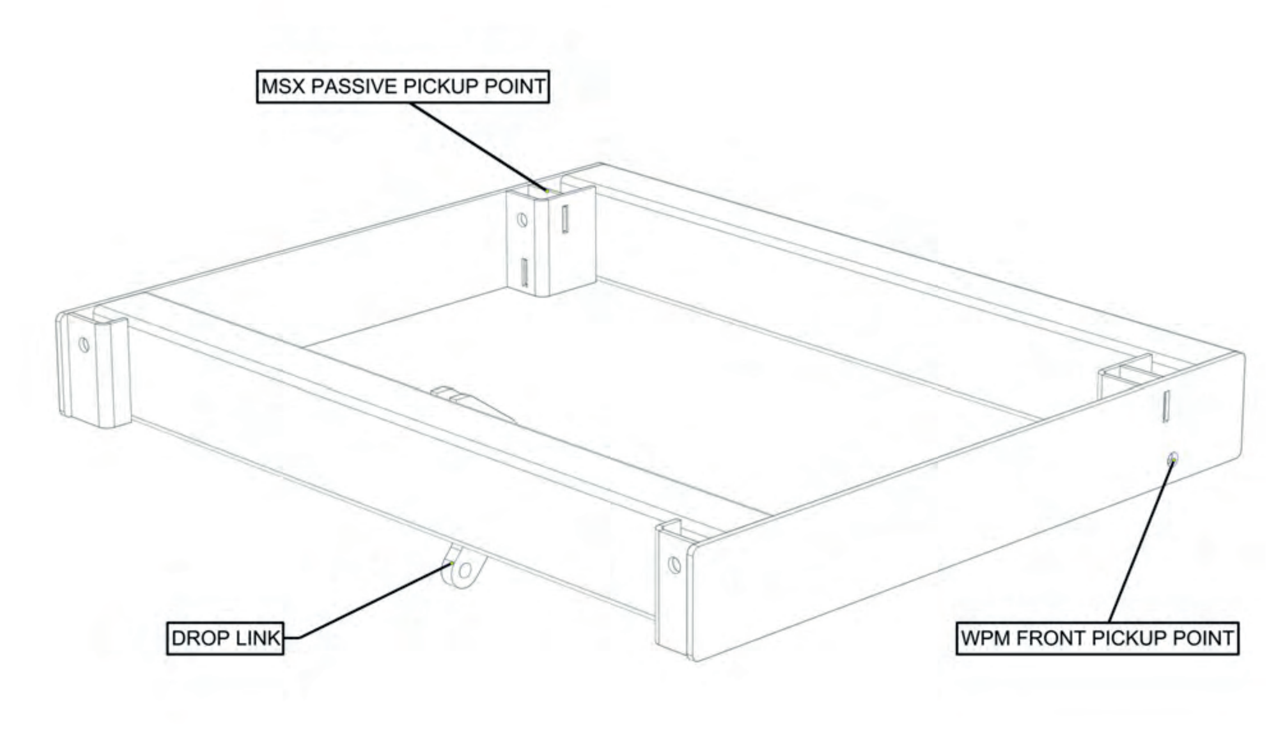
The Flying Frame is available either pre-fitted with an inclinometer (as Martin Audio Part No. ASF20064), or without (as Martin Audio Part No. ASF20054). The inclinometer will be unnecessary in fixed installations, as the angle will be set and fixed as the cabinets are mounted.


MOTOR POINTS
MSX PASSIVE FRONT PICKUP POINT
MSX PASSIVE REAR PICKUP POINT

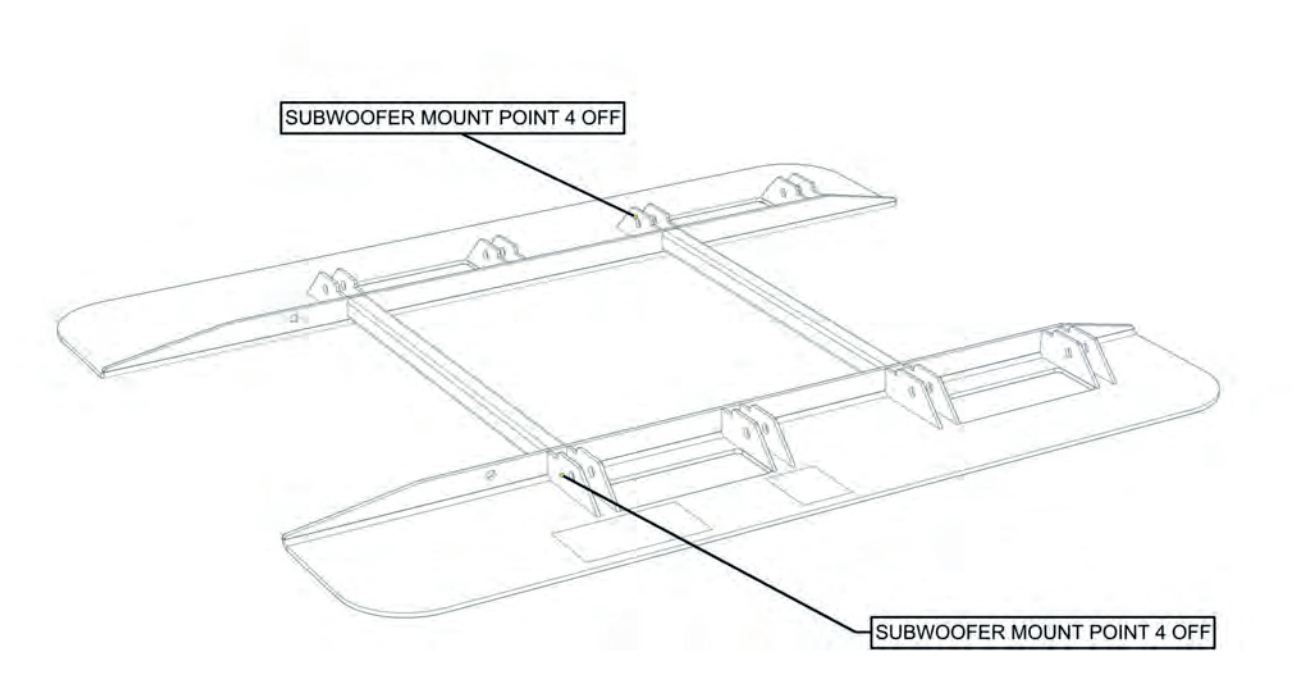
WPMMSXGRIDi Transition Frame


MSX PASSIVE PICKUP POINT
WPM REAR PICKUP POINT
RIGGING PIN
DROP LINK
WPM PICKUP POINT

The Transition Frame is designed to interface between MSX Passive subwoofers and WPM cabinets in a single combined array. It provides a four point rigging system for MSX Passive subwoofers above the frame, and a three point rigging system for WPM cabinets below the frame.


MSX PASSIVE PICKUP POINT
DROP LINK
WPM FRONT PICKUP POINT

Outrigger



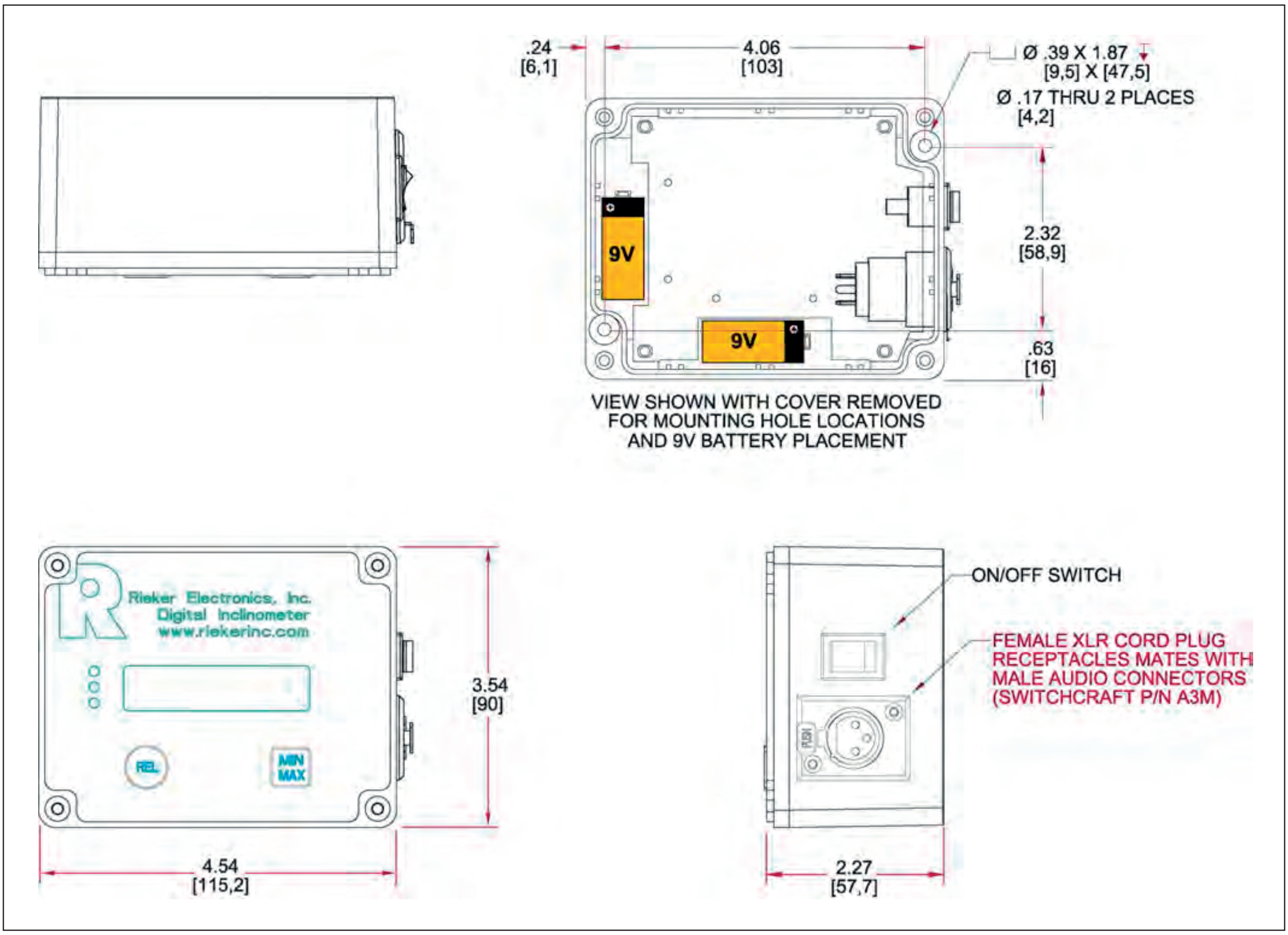
The Outrigger provides a stable ground support for MSX Passive subwoofers, and pole mount arrays made up of WPM cabinets and MSX Passive subwoofers. Four subwoofer attachment points are provided on each side of the frame, allowing for the ground stack's centre of gravity to be correctly positioned in relation to the frame.

Flightcase for four WPM (RoW and US versions)

An optional, dedicated flightcase is available for an array of four WPM cabinets. This will allow safe transportation and convenient rigging and de-rigging if your system is to be portable. Note that all rigging accessories (except the Rigging Pins) should be removed before stowing the WPM cabinets in the flightcase for shipment.

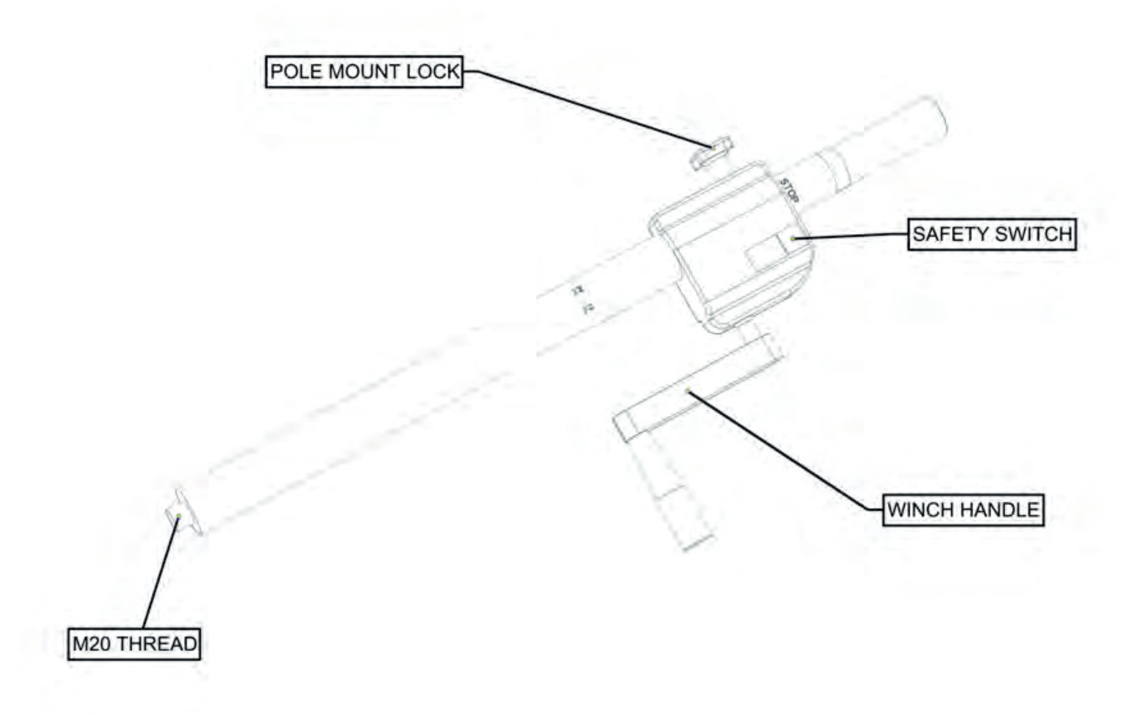
Inclinometer Assembly

Martin Audio supplies an optional remote angle monitoring system which can used to reliably check the angle at which the WPM array is flown at (relative to the horizontal). It consists of a sensor (mounted within the Flying Frame) and a remote display unit. Interconnection is via a standard XLR mic cable.

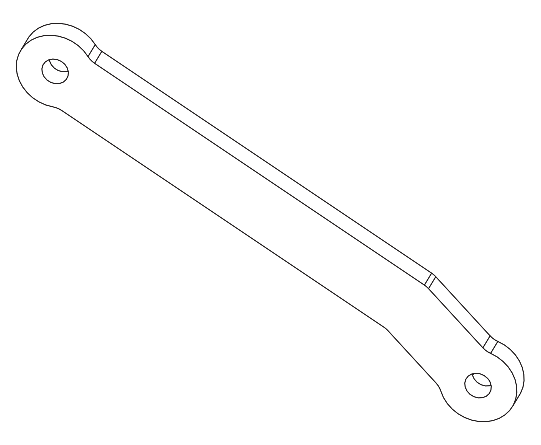

.24
[6,1]
4.06
[103]
Ø .39 X 1.87
[9,5] X [47,5]
Ø .17 THRU 2 PLACES
[4,2]
9V
9V
2.32
[58,9]
.63
[16]
VIEW SHOWN WITH COVER REMOVED FOR MOUNTING HOLE LOCATIONS AND 9V BATTERY PLACEMENT
Rieker Electronics, Inc.
Digital Inclinometer
www.riekerinc.com
REL
MIN MAX
3.54
[90]
4.54
[115,2]
ON/OFF SWITCH
FEMALE XLR CORD PLUG RECEPTACLES MATES WITH MALE AUDIO CONNECTORS (SWITCHCRAFT P/N A3M)
PUSH
2.27
[57,7]

Variable Height Pole

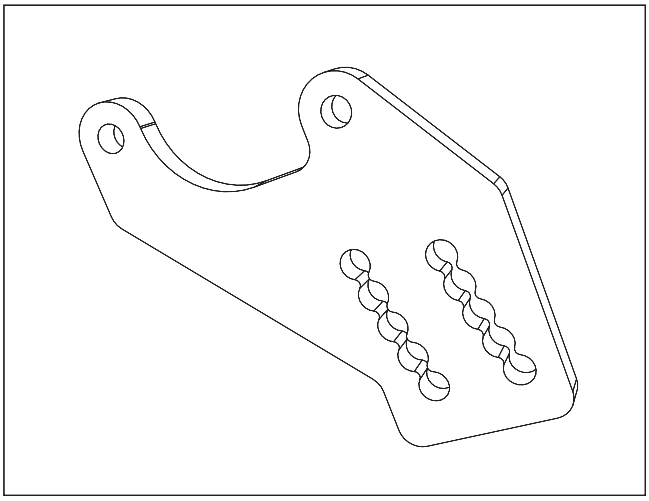
This is used to elevate an array of four WPM cabinets above the MSX Passive, SX118, or SX218 as a single assembly. The height of the array can be set to that required according to the DISPLAY project by turning the handle, and then locked in position with the integral clamp.



Long Ground Stack Bar



Short Ground Stack Bar

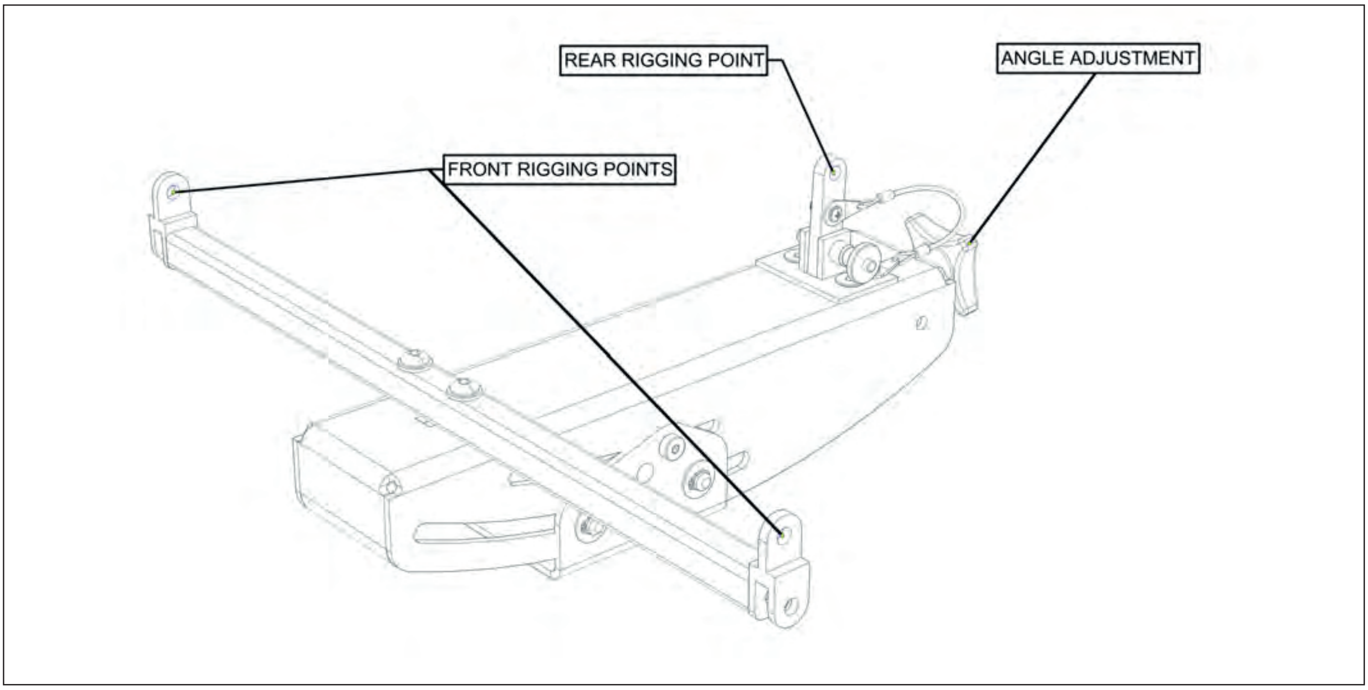


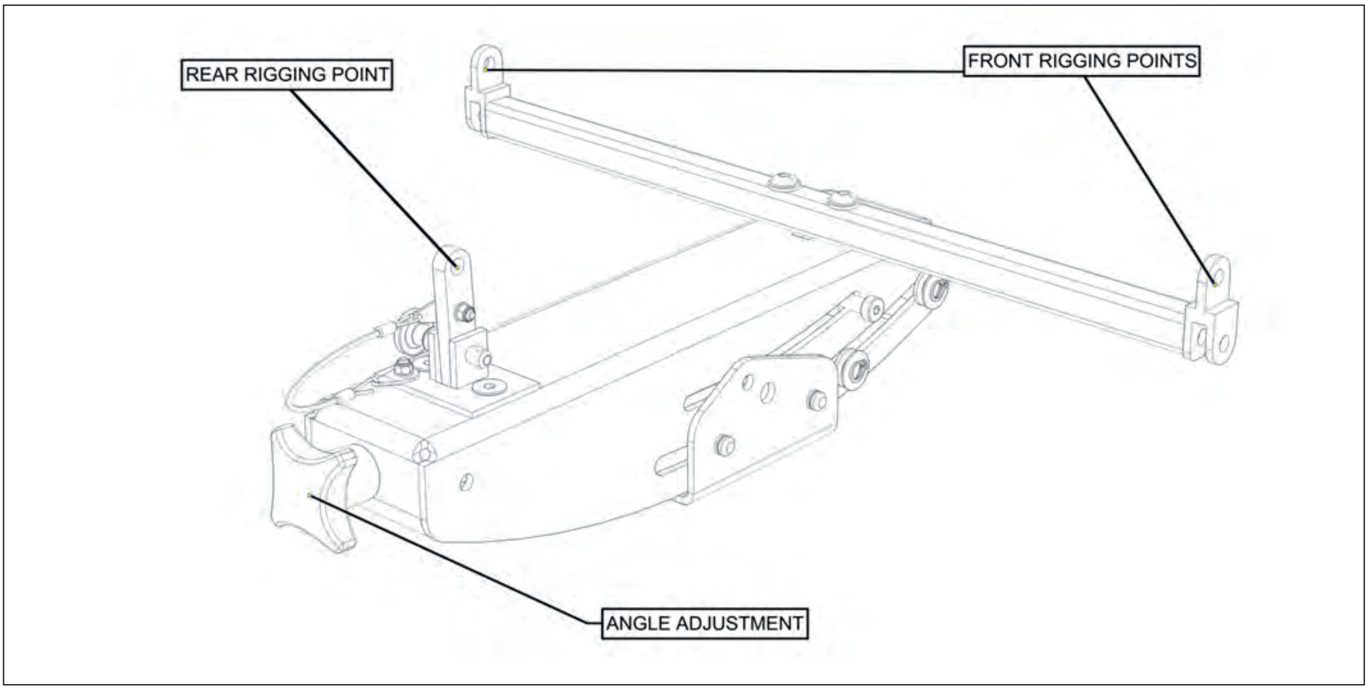
These precision alignment bars are used in conjunction with the touring Flying Frame to define the angle between the WPM array and the Flying Frame when the system is configured for ground stacking. Two versions are available, long (Martin Audio Part No. ASF20056) and short (ASF20057); the two sizes allow different ranges of angles to be set.

WPM Universal Bracket

The Universal Bracket enables an array of up to four WPM cabinets to be pole-mounted on an MSX Passive, SX118, or SX218 subwoofer using the Variable Height Pole at a range of tilt angles from 0° to -18°, or an array of up to four WPM cabinets to be flown from a truss-mounted scaffold clamp. It provides rigging points for WPM cabinets at the front, a rigging point at the rear, and continuously variable angle adjustment from -18° to +18° by means of a handwheel.

The bracket's fixing is via a single 13 mm dia. hole, which is fitted with a ASF20045 Pole Mount Adapter to fit the Variable Height Pole. By replacing the Pole Mount Adapter with a scaffold clamp, the bracket can also be used inverted, to fly a single four cabinet WPM array (without an MSX Passive subwoofer). The cross member at the front must be inverted, and always used with the single tab upwards and the double rigging tabs downwards. Note that it is not possible to mount more than four WPMs on a Variable Height Pole by any method, and that the Flying Frame must be used to fly all other system configurations.





Flown Systems

WPM's rigging has been derived from the highly successful rigging system employed on the MLA Mini Multicellular system. This has proved to be popular, quick and above all safe. Rigging WPM will be instantly familiar to anyone who has rigged Martin Audio systems in the past, we have made a few minor improvements to make it even easier to use and it has proved to be incredibly quick to fly and land.

WPM uses a three-point rigging system. The mechanical load of the array is taken through the side-mounted steel rigging strips which securely connect one cabinet to the next, while the best possible coupling between cabinets is ensured by means of the rear rigging points which allow a range of angle adjustment from 0.5° to 10°.

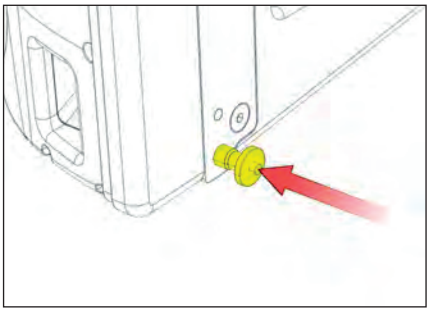


Fig.1 - push central button

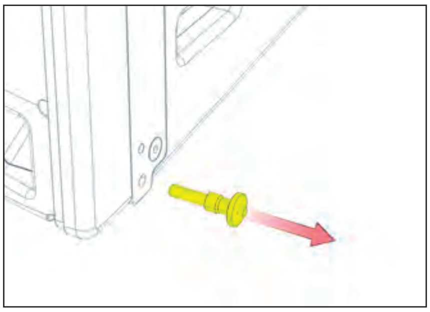


Fig.2 - remove rigging pin

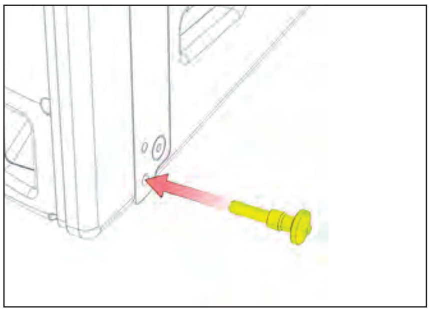


Fig.3 - replace rigging pin

The cabinets are joined using machined quick release Rigging Pins. These have spring loaded ball bearings at the end of the pin which protrude beyond the outer diameter of the pin thus locking them in place. To release them, the central button is depressed (fig. 1) whilst pulling the pin clear using the wide flange (fig. 2). This is best done with the fore and index fingers pulling the pin whilst your thumb depresses the central button, a very quick and easy operation. When using the pins to link cabinets, the central button must again be depressed so the pin can be pushed into position (fig. 3). It is important to check that the central button does not remain depressed once you have put it in place as this would indicate that the pin has not been pushed all the way into position and the ball bearings at the end of the pin have not been able to pop out and lock the pin in place. If the pin is not locked the array is unsafe. The pin MUST be repositioned until it is securely locked in place.

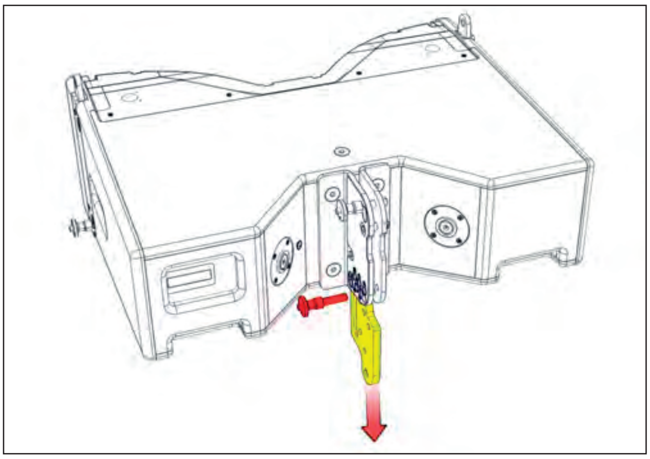


Fig 4 - drop link down

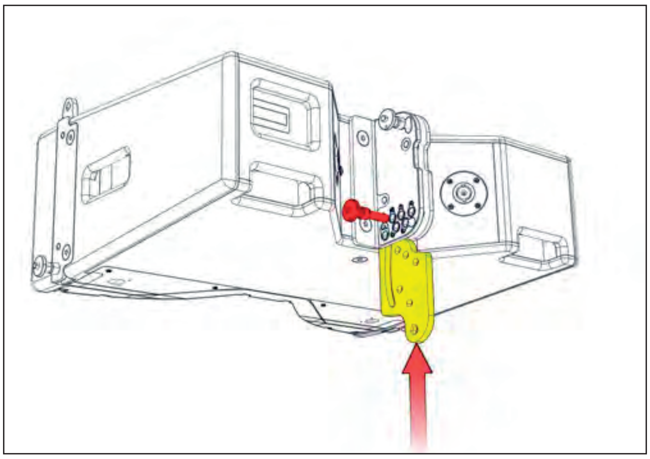


Fig.5 - drop link up

Inter-cabinet angles are set using the rear rigging assembly. This consists of a sliding drop link bar with indexed holes which can be slid vertically downwards between the two constraining steel brackets, and secured with the Rigging Pins in one of several different positions determined by the holes in the rear bracket assembly, allowing inter-cabinet angle adjustment in five incremental steps of 0.5°, 2°, 4°, 6.5°, and 10°.

Rigging WPM with the WPMGRIDt Touring Flying Frame

The fastest and most efficient procedure for rigging an array of WPM cabinets in a touring environment is to work in blocks of four modules lifting them straight out of the transport case, which is designed to offer excellent protection, ease of handling, and simplified rigging. Inter-cabinet angles are predicted from the Martin Audio DISPLAY software, and these angles can be preset while the boxes are still in the transport case.

The following example illustrates the procedure for rigging an array of eight WPM cabinets with the Touring Flying Frame:

- To pre-select the inter-cabinet angles while in the case, release the drop link from the first box by removing the Rigging Pin from the LOCK position. Slide it down and engage it with the appropriate angle hole in the second box as predicted by the DISPLAY software, securing it with a Rigging Pin.

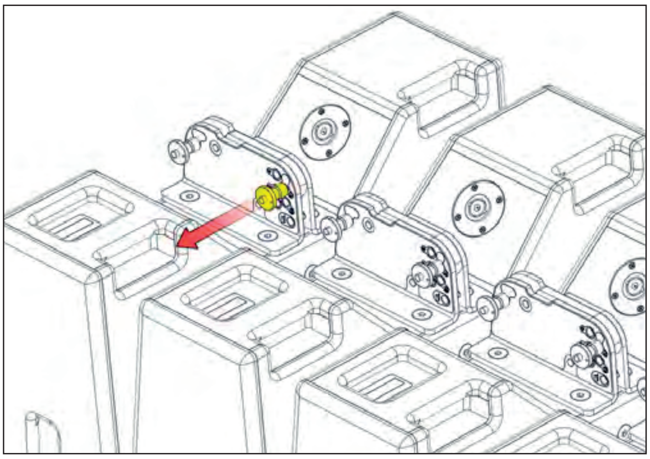


Fig 6 - remove rigging pin

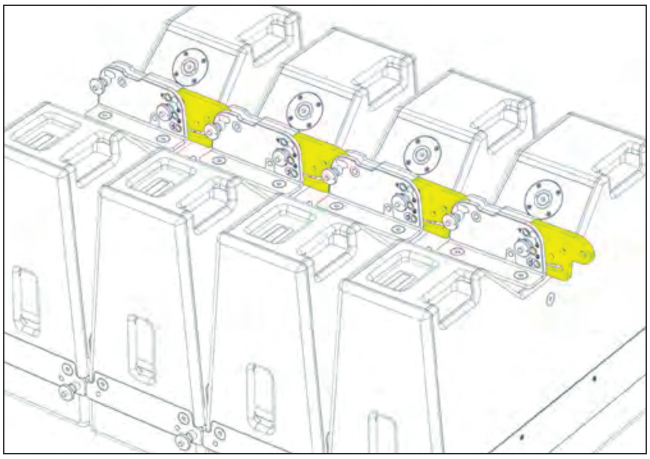


Fig.7 - preselect angles

- Continue to preselect the inter-cabinet angles on the remaining three cabinets according to the DISPLAY software prediction.
- Attach shackles to the front and rear lift points of the flybar. Offer the flybar up to the top box and attach it to the front rigging points by inserting a Rigging Pin at each side. Attach the flybar rear link to the top box at the lock position.
- Attach chain motors to the shackles and raise the first block of four cabinets to a convenient working height, allowing sufficient space underneath for a further block of cabinets.

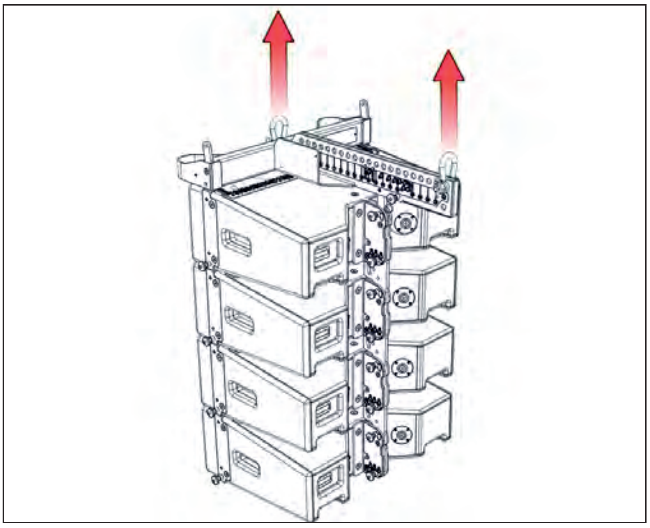


Fig.8 - lift first block

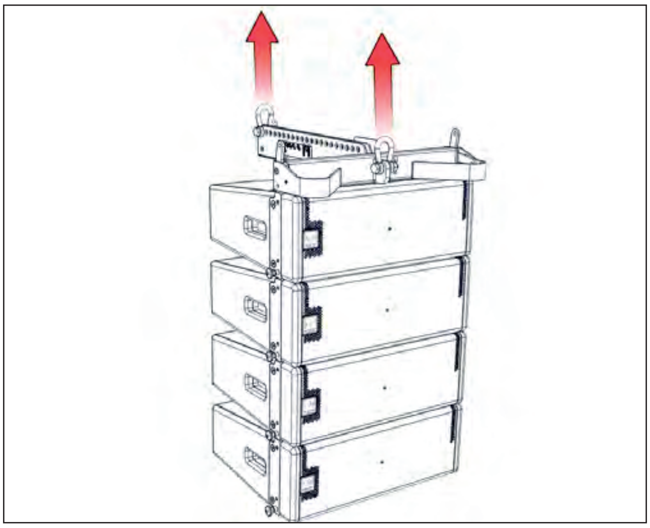


Fig.9 - lift first block

- Position the next block of cabinets underneath the array, having first preselected the inter-cabinet angles as before according the DISPLAY software prediction.
- Release the drop link on the fourth cabinet and line it up with the rear rigging spine on the fifth cabinet at the angle position predicted by the DISPLAY software. Secure with a Rigging Pin.

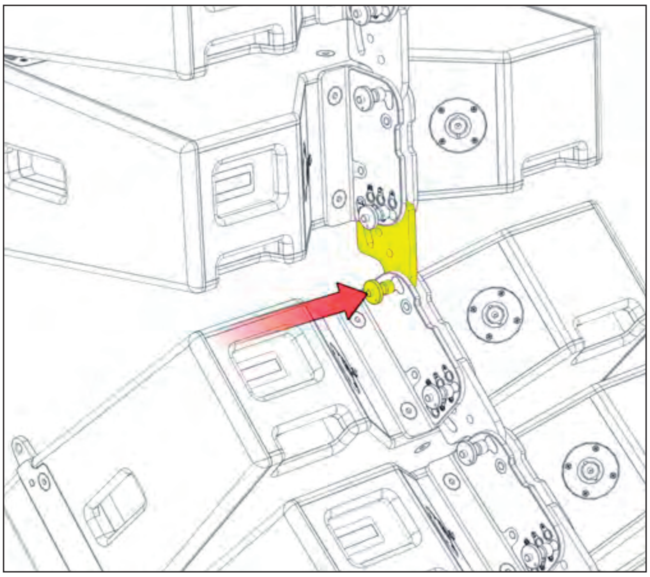


Fig.10 - engage drop link

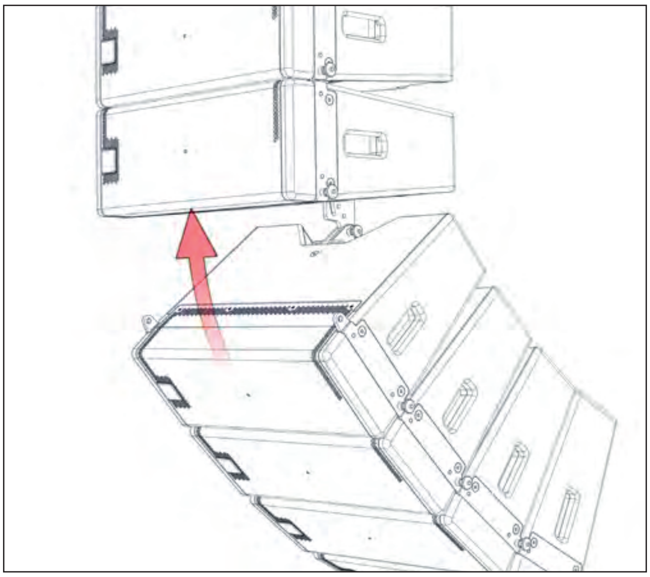


Fig.11 - attach second block

- Lift the array, align the front rigging positions on the fifth cabinet and secure with Rigging Pins at each side.

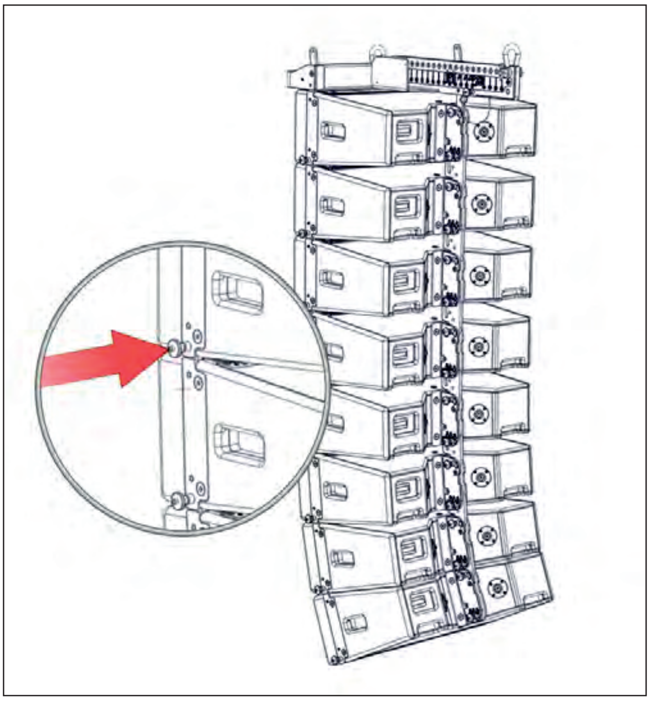


Fig.12 - insert rigging pin

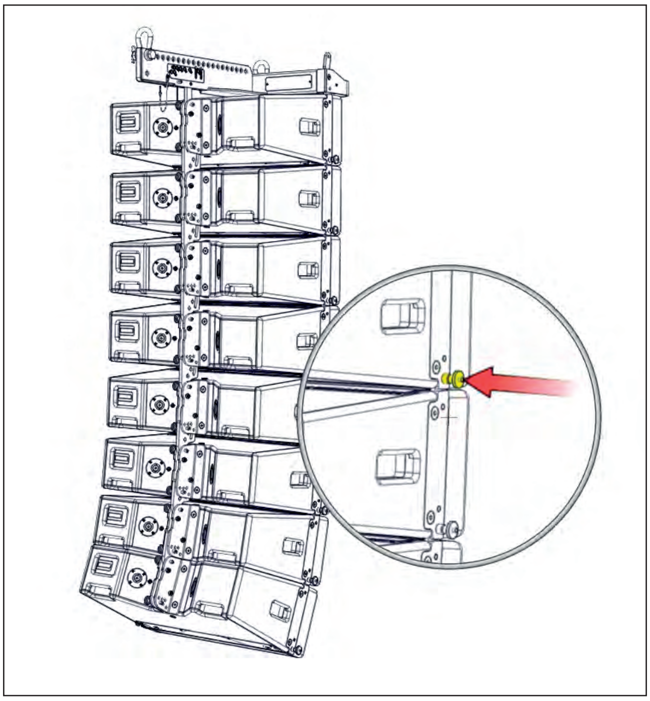


Fig.13 - insert rigging pin

Landing the Array

To land the array simply reverse the above procedure.

- Position a transport case under the array, and lower the array to a convenient working height. Take the weight of the bottom four cabinets and release the front Rigging Pins from the top of the fifth cabinet, allowing the bottom four cabinets to rotate downwards and backwards, supported by the drop link on the fourth cabinet.

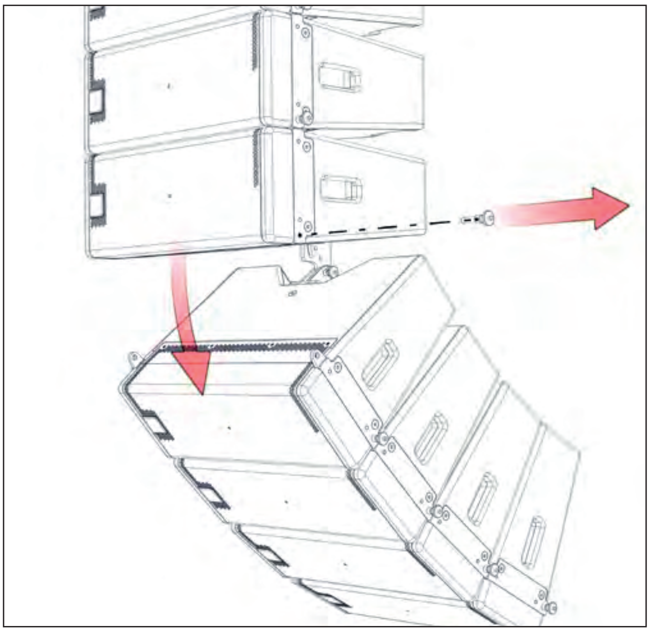


Fig.14 - rotate block downwards

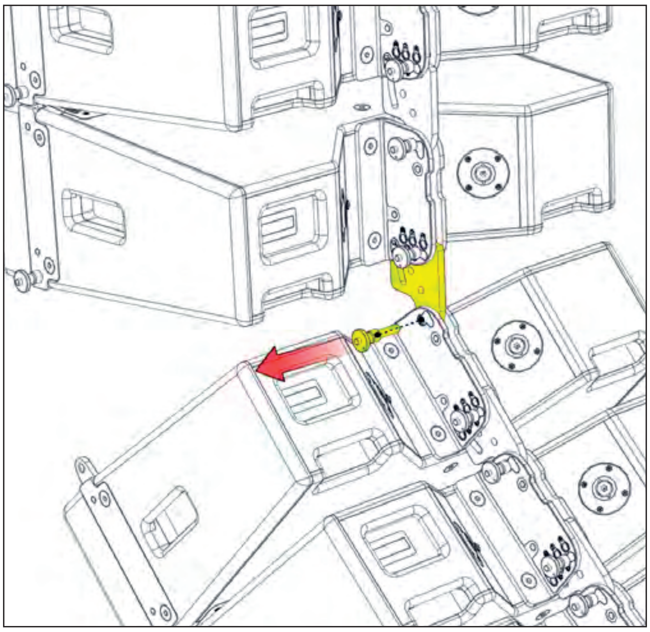


Fig.15 - remove rigging pin

- Lower the array so that the bottom four cabinets are landed on to a transport case.
- Release the drop link from the fourth cabinet and stow it for transportation.
- Lower the array, take the weight of the remaining four cabinets, and release the Rigging Pins from the Flying Frame.
- Lower the cabinets face down on to a transport case.

Rigging WPM with the WPMGRIDi Install Flying Frame

The procedure for flying a permanently installed system of WPM cabinets is practically identical to that for touring applications; the only difference being that this method uses the simplified install Flying Frame with either one or two pickup points. It is recommended that the cabinets are prepared and assembled face down in blocks of four with angles preselected according to the Martin Audio DISPLAY software.

The following example illustrates the procedure for rigging an array of eight WPM cabinets with the install Flying Frame:

- To pre-select the inter-cabinet angles release the drop link from the first box by removing the Rigging Pin from the LOCK position. Slide it down and engage it with the appropriate angle hole in the second box as predicted by the DISPLAY software, securing it with a Rigging Pin.
- Continue to preselect the inter-cabinet angles on the remaining three cabinets according to the DISPLAY software prediction.
- Attach shackles to the front and rear lift points of the flybar. If using only one pickup point attach a shackle to the pickup hole predicted by the DISPLAY software. Offer the flybar up to the top box and attach it to the front rigging points by inserting a Rigging Pin at each side. Attach the flybar rear link to the top box at the (bar) position.
- Attach a chain motor(s) to the shackle(s), and raise the first block of four cabinets to a convenient working height allowing sufficient space underneath for a further block of cabinets.
- Position the next block of cabinets underneath the array, having first preselected the inter-cabinet angles as before according the DISPLAY software prediction
- Release the drop link on the fourth cabinet and line it up with the rear rigging spine on the fifth cabinet at the angle position predicted by the DISPLAY software. Secure with a Rigging Pin.

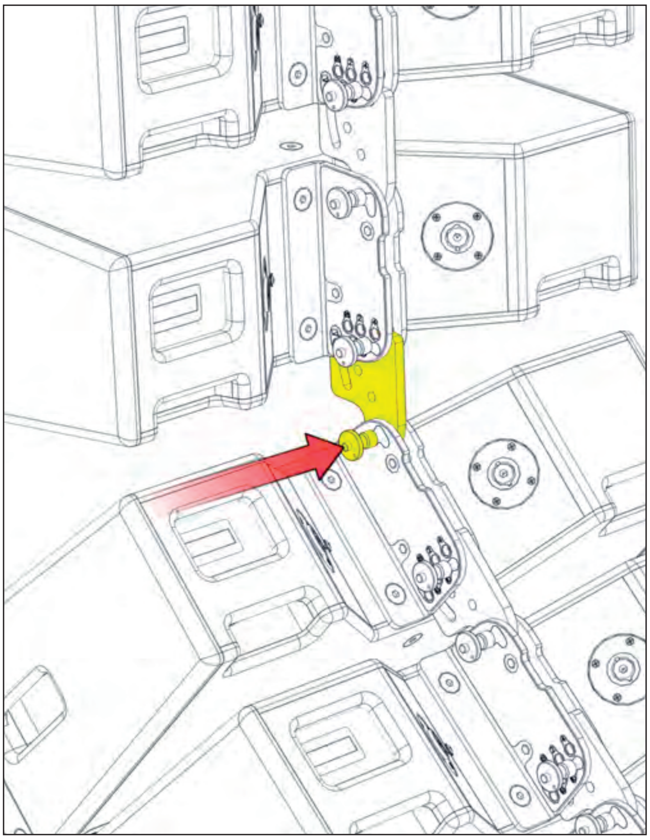


Fig.16 - attach drop link

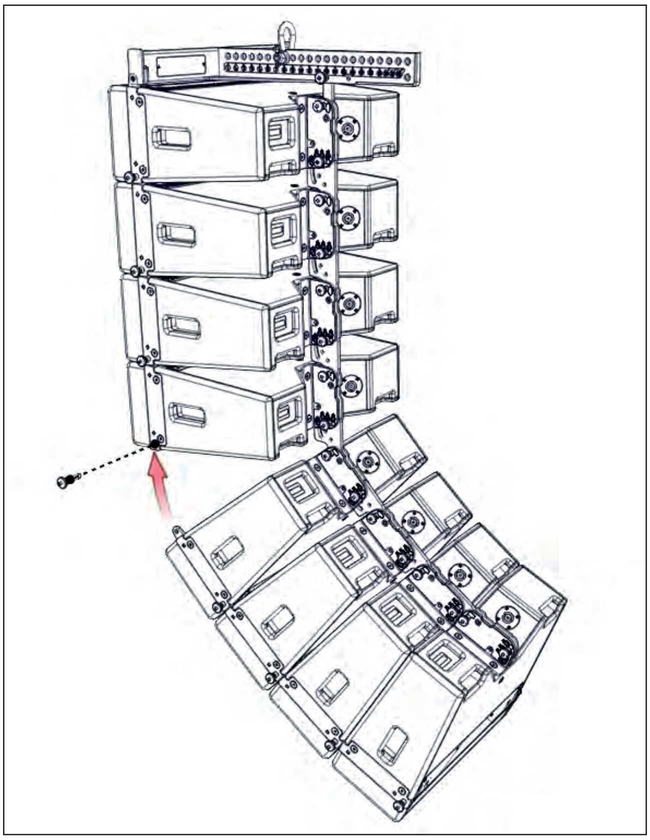


Fig.17 - rotate second block

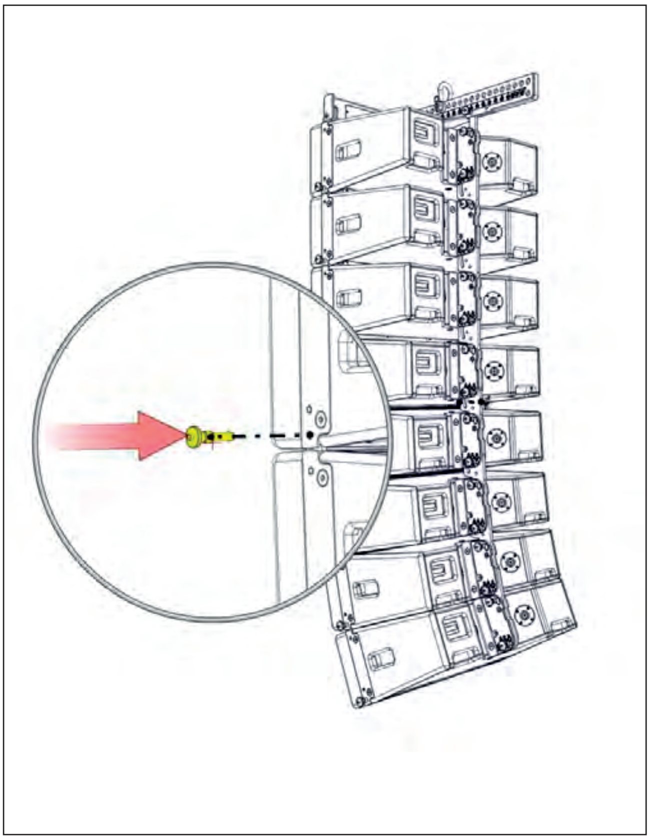


Fig.18 - insert rigging pin

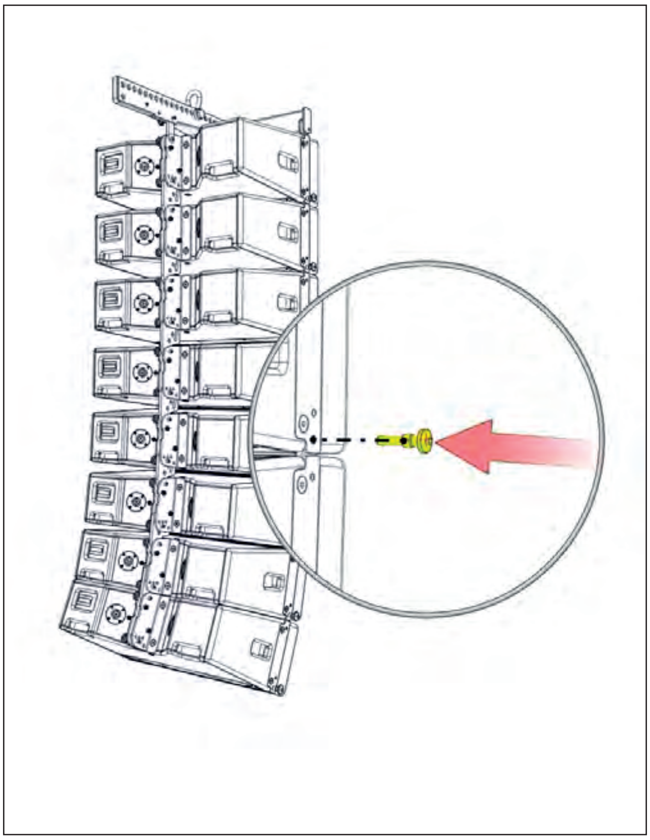


Fig.19 - insert rigging pin

Rigging WPM with the WPMGRIDi Install Flying Frame - Single Box Method

WPM cabinets can also be flown one at a time to form an array in a permanent installation. In this case the cabinets are prepared, and inter-cabinet angles preselected, individually according to the Martin Audio DISPLAY software prediction.

The following example illustrates the procedure for rigging an array of eight WPM cabinets one at a time with the install Flying Frame:

- Attach shackles to the front and rear lift points of the flybar. If using only one pickup point attach a shackle to the pickup hole predicted by the DISPLAY software. Offer the flybar up to the first box and attach it to the front rigging points by inserting a Rigging Pin at each side. Attach the flybar rear drop link to the box at the (bar) position.
- Attach a chain motor(s) to the shackle(s), and raise the first cabinet to allow a second cabinet to be positioned face down underneath.
- Release the drop link on the first cabinet and line it up with the rear rigging spine on the second cabinet at the angle position predicted by the DISPLAY software. Secure with a Rigging Pin.
- Rotate the second box upwards to engage with the front rigging points, and secure with a Rigging Pin at each side.

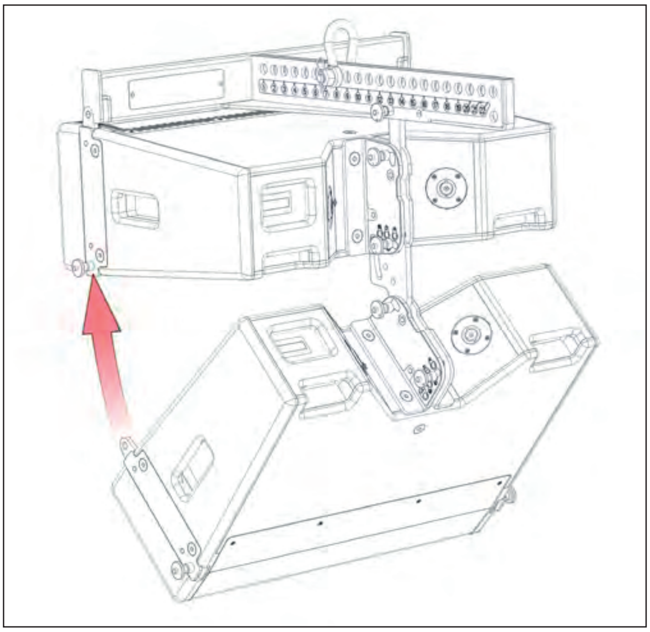


Fig.20 - engage drop link

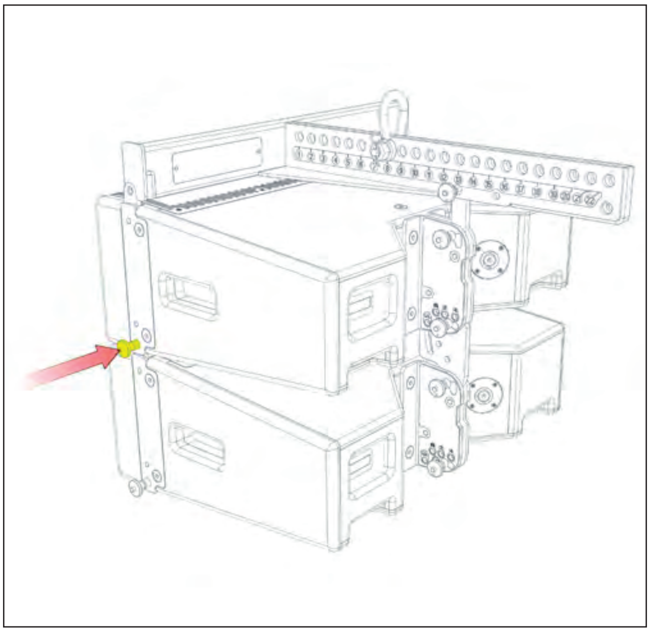


Fig.21 - secure second cabinet

- Raise the array and position a third cabinet underneath. Release the drop link on the second cabinet and line it up with the rear rigging spine on the second cabinet at the angle position predicted by the DISPLAY software. Secure with a Rigging Pin, rotate the third box upwards to engage the front rigging points, and secure with a Rigging Pin at each side.

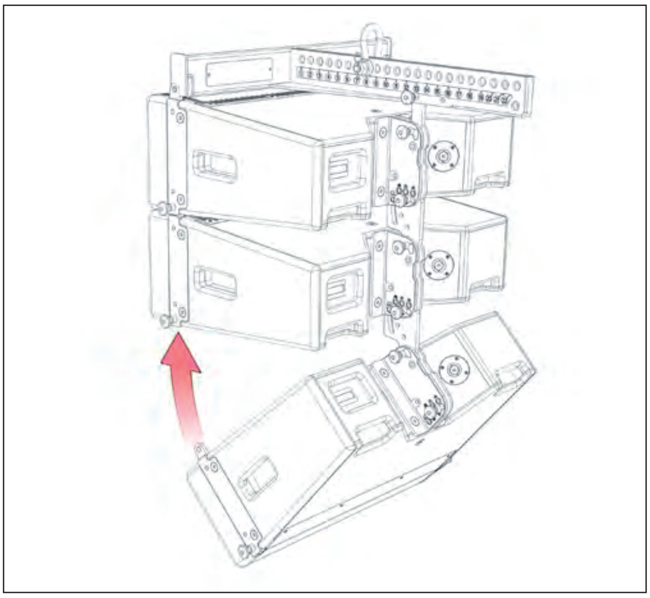


Fig.22 - engage drop link

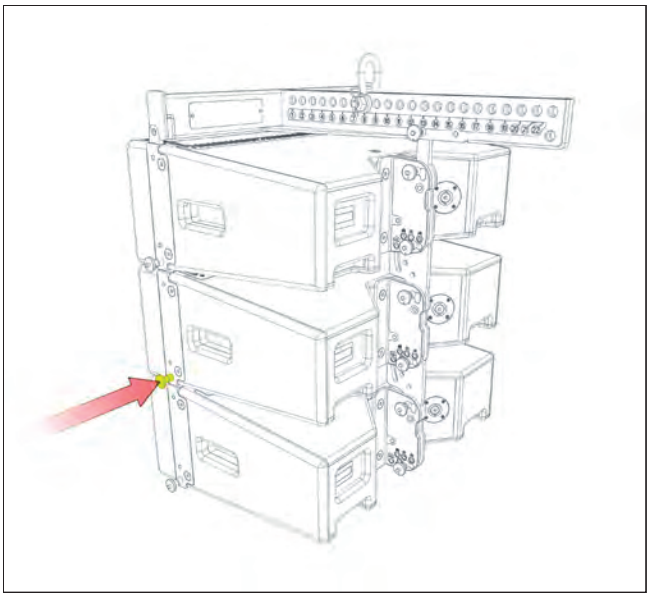


Fig.23 - secure third cabinet

- Continue to attach the remaining cabinets, ensuring that the inter-cabinet angles are set correctly according to the DISPLAY software.
- Raise the array to the final trim height.

Ground Stacking WPM

Ground stacks of WPM cabinets are assembled using the touring Flying Frame. The front stabiliser bars provide a wide and stable platform for assembling an array of up to six WPM cabinets.

- Place the ground stack bar at the desired location. Position the first cabinet on top of the bar, aligning the lower front rigging points with the rigging points on the bar. Secure with Rigging Pins.

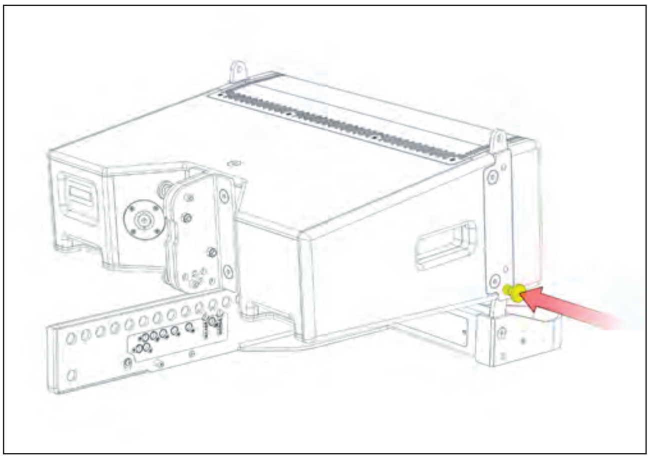


Fig.24 - insert rigging pin

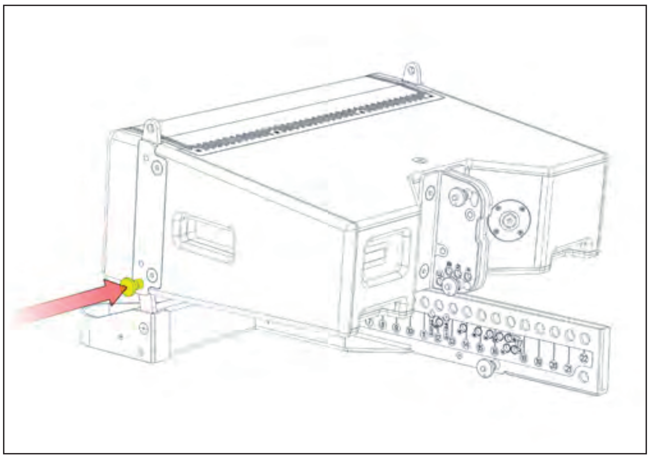


Fig.25 - insert rigging pin

- Rotate the rear of the cabinet upwards and fix it in position with the long or short GS bar as specified in the DISPLAY 2.3 project (long GS bar shown here).

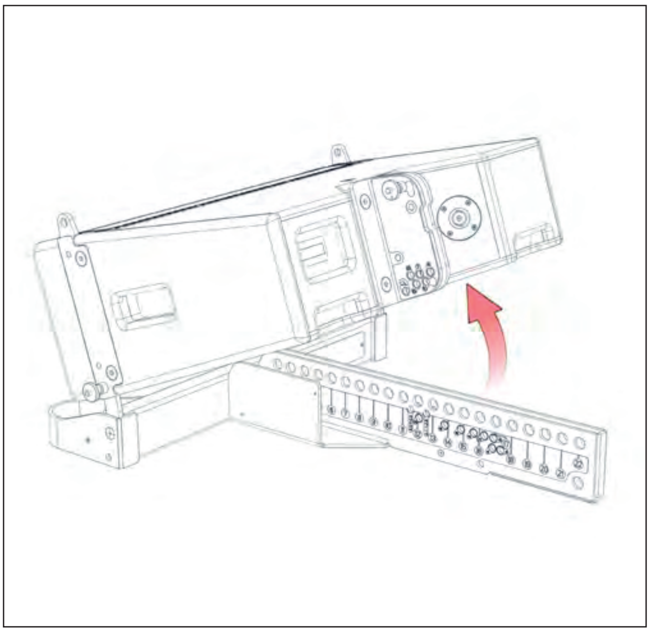


Fig.26 - rotate cabinet

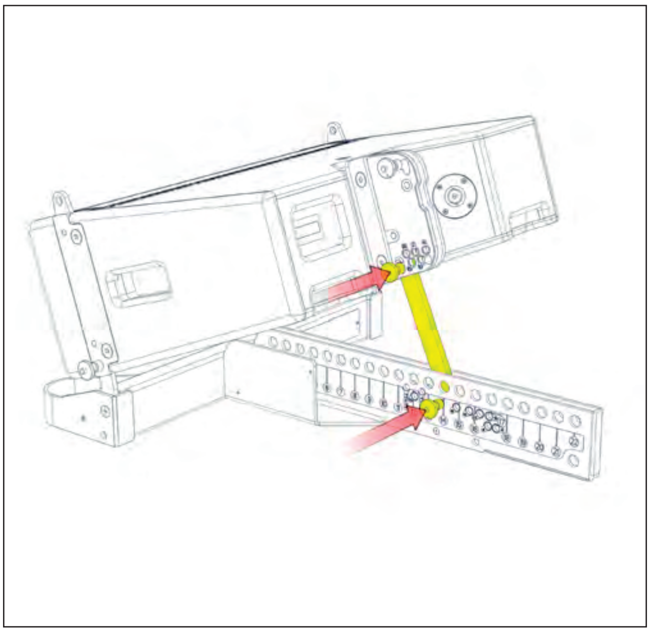


Fig.27 - fit long GS bar

- Position the second cabinet on top of the first, aligning the front rigging points. Secure with Rigging Pins at each side. Set the inter-cabinet angle according to the DISPLAY software prediction. Continue to add further cabinets one at a time to the ground stack, securing the front rigging points with Rigging Pins and setting the inter-cabinet angles as you go along, until the ground stack is complete.

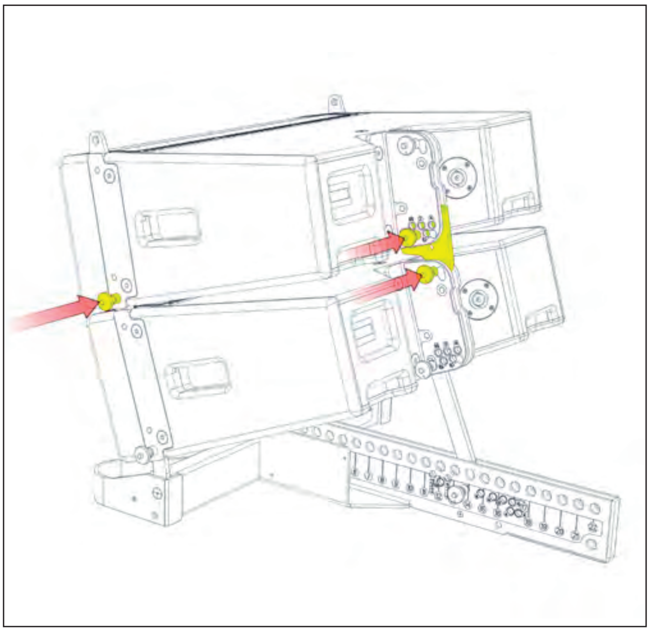


Fig.28 - attach second cabinet

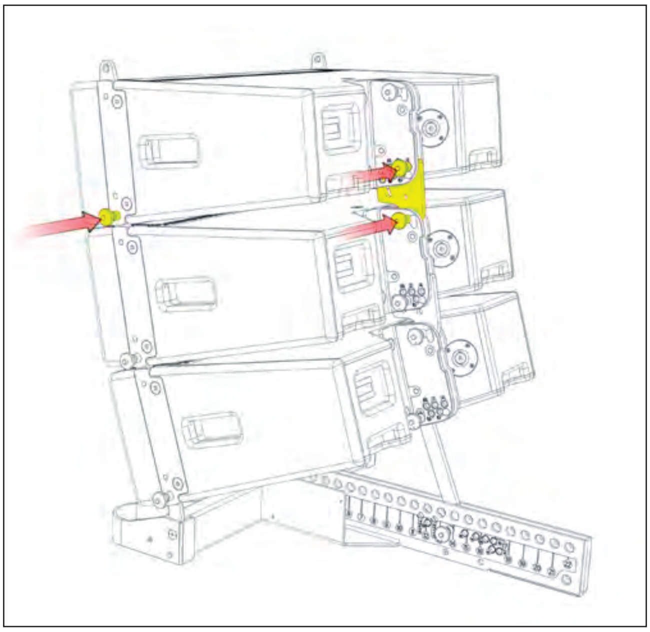


Fig.29 - attach third cabinet

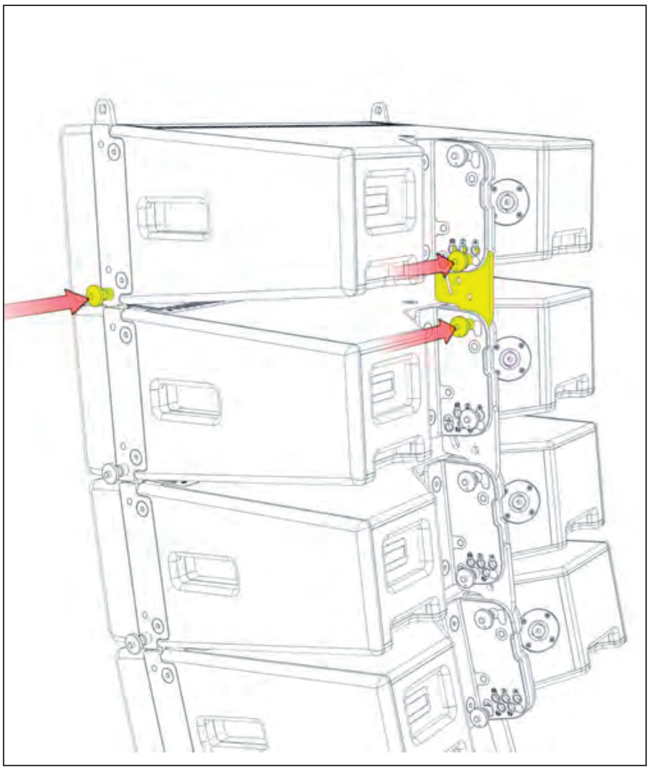


Fig.30 - attach fourth cabinet

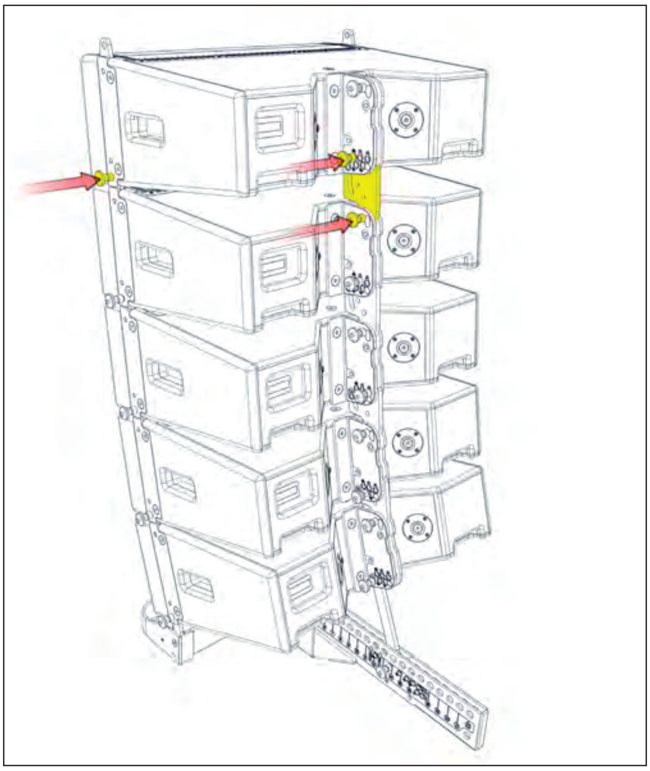


Fig.31 - attach fifth cabinet

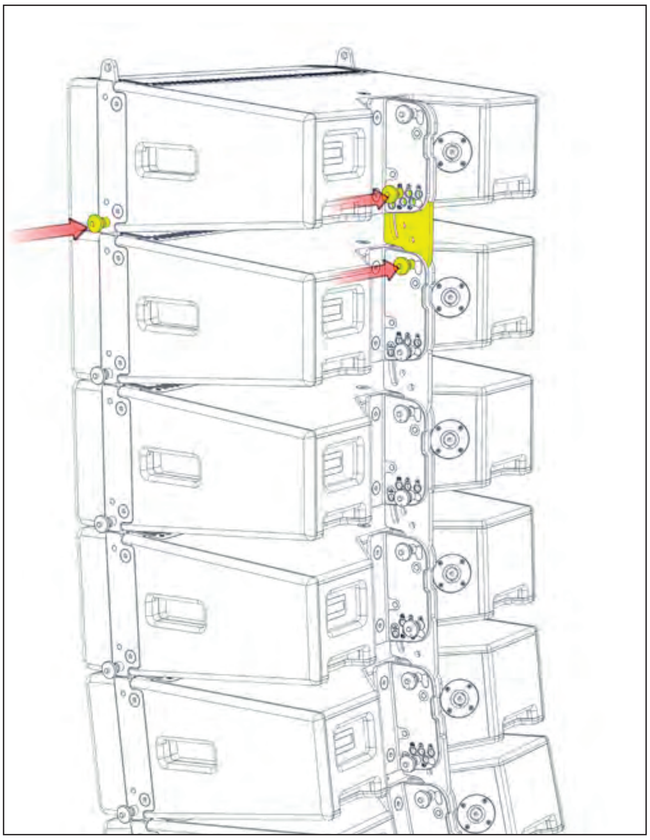


Fig.32 - attach sixth cabinet

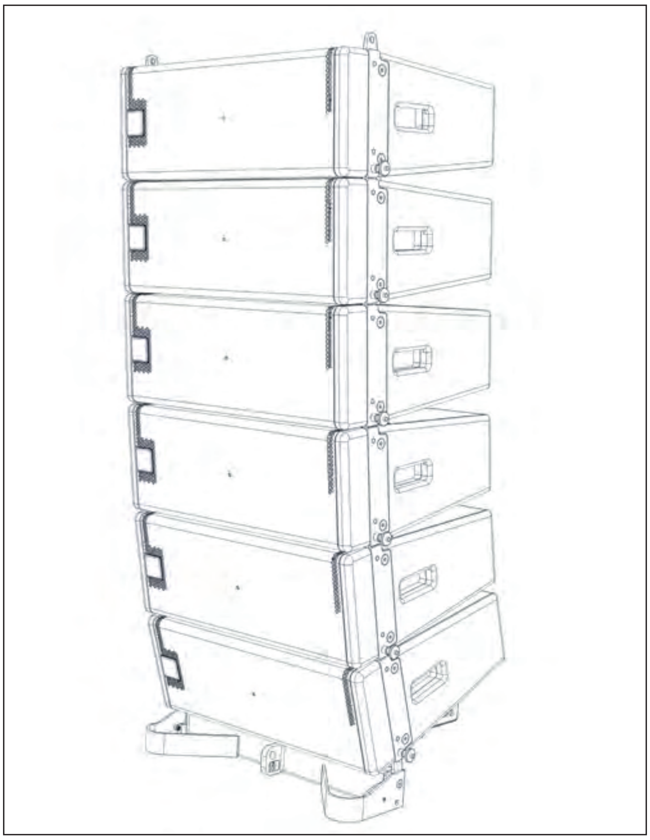


Fig.33 - complete ground stack

Pole Mounting WPM with the Pole Mount and Universal Bracket

- Start with the MSX Passive subwoofer face down on its wheelboard. Rotate the four dropdown brackets located in the base of the MSX Passive so they are protruding outwards.

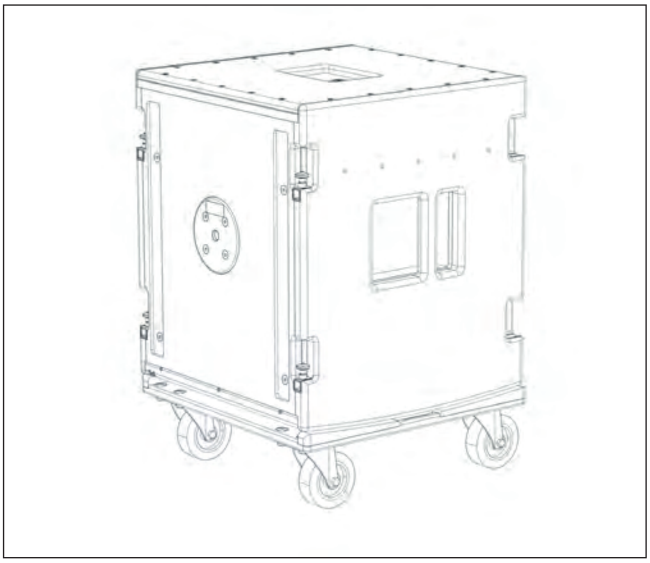


Fig.34 - MSXP subwoofer

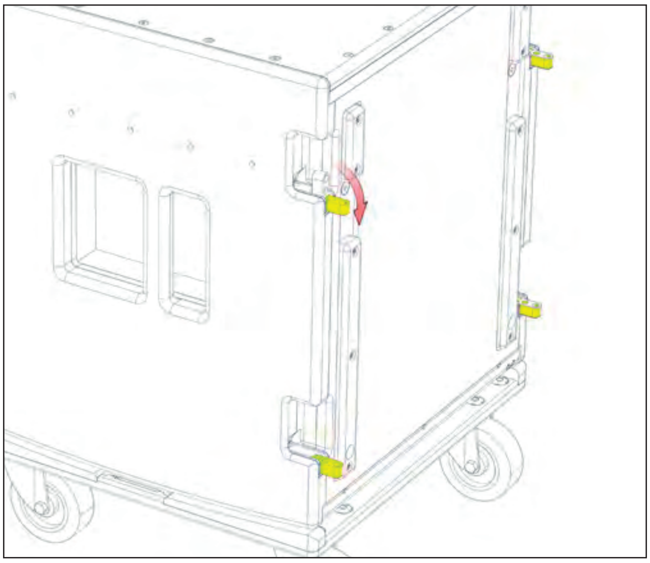


Fig.35 - rotate dropdown brackets

- Attach the Outrigger to the bottom of the MSX Passive cabinet by mating these dropdown brackets with the holes in the baseplate box sections as shown. Use the front location as indicated on the baseplate membrane for this configuration (the rear location is only needed for larger configurations). With the MSX Passive on its wheelboard and the front edge of the Outrigger on the floor, the dropdown brackets should align with the correct holes. Secure all four dropdown brackets with Rigging Pins.

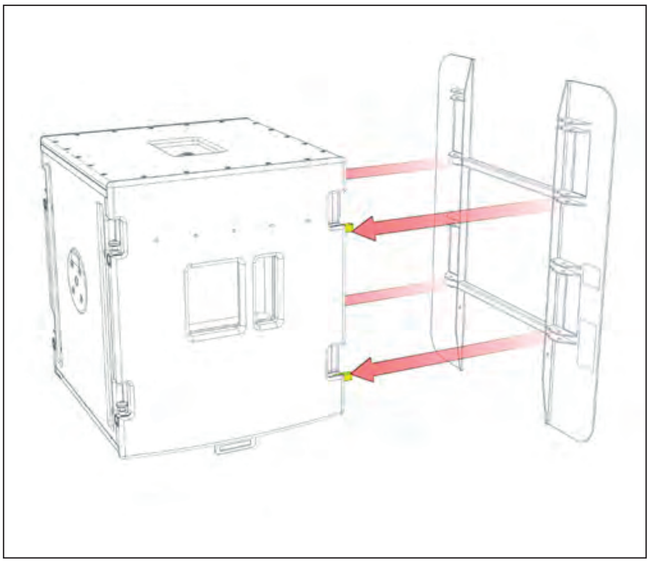


Fig.36 - attach outrigger

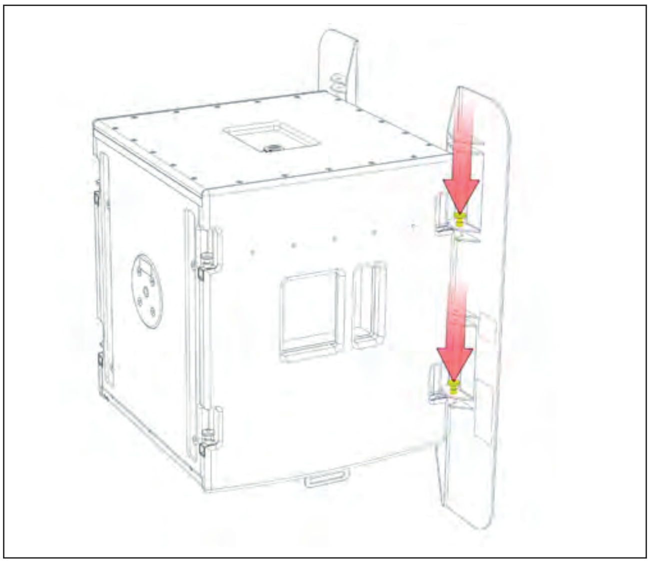


Fig.37 - secure outrigger

- Rotate the MSX Passive subwoofer and Outrigger through 90° so that the assembly is standing on the Outrigger. Remove the wheelboard. Take the pole mount and ensure that the pole is fully retracted. Screw the pole securely into the threaded plate on the top of the MSX Passive.

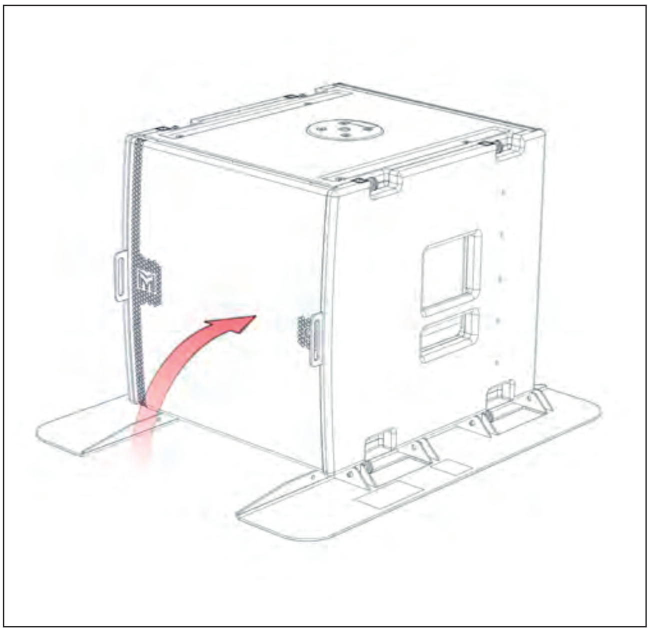


Fig.38 - rotate sub and outrigger

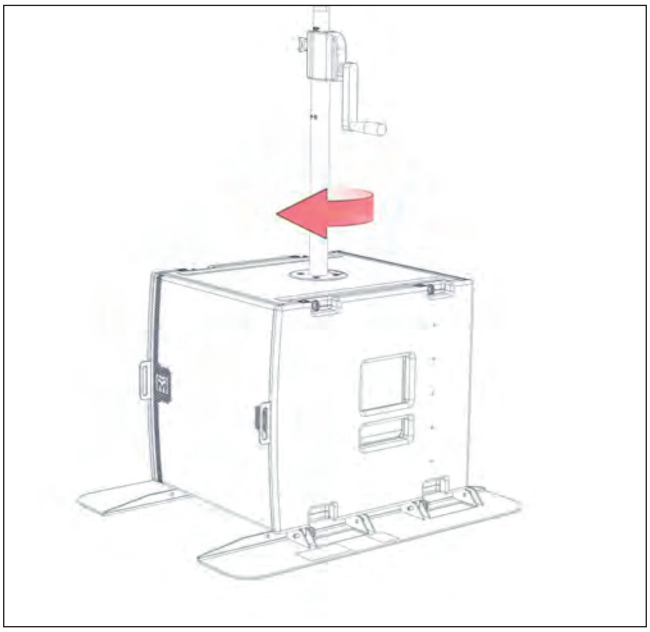


Fig.39 - attach pole mount

- Attach the universal tilt bracket to the top of the telescopic pole and secure by tightening the boss onto the pole using the knob.

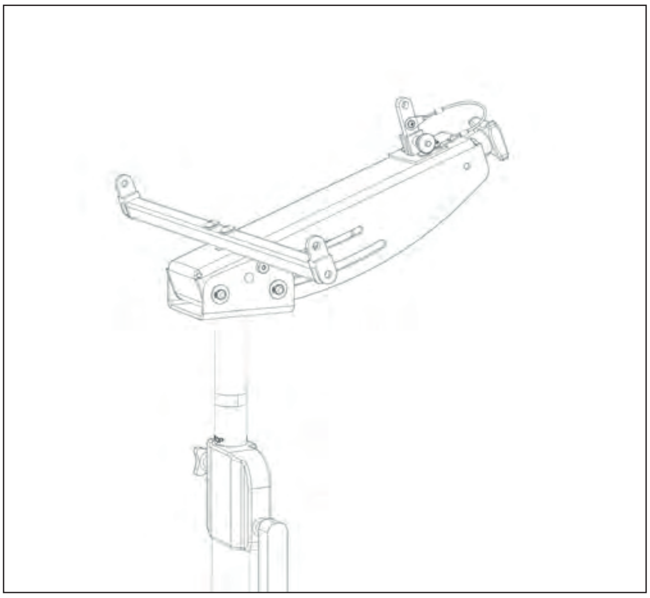


Fig.40 - attach Universal Bracket

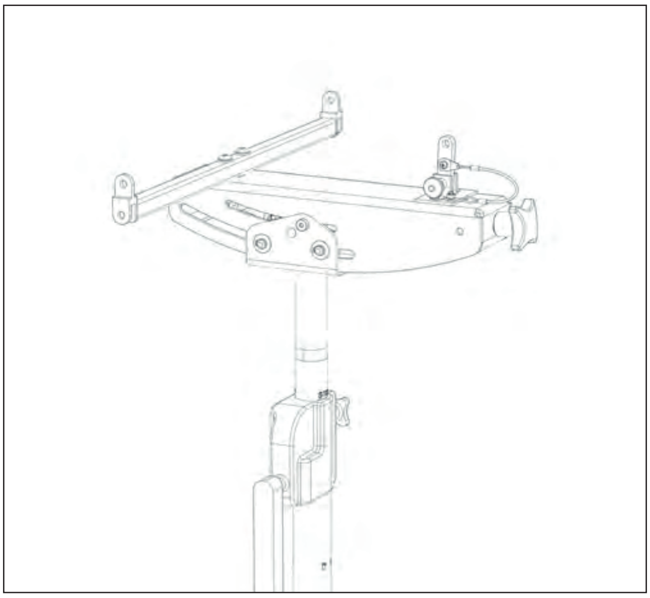


Fig.41 - attach Universal Bracket

- Lift the first WPM cabinet onto the universal tilt bracket. The lugs on the ends of the main cross-arm should mate with the slots in the front corners of the cabinet. Secure these points with flying pins.

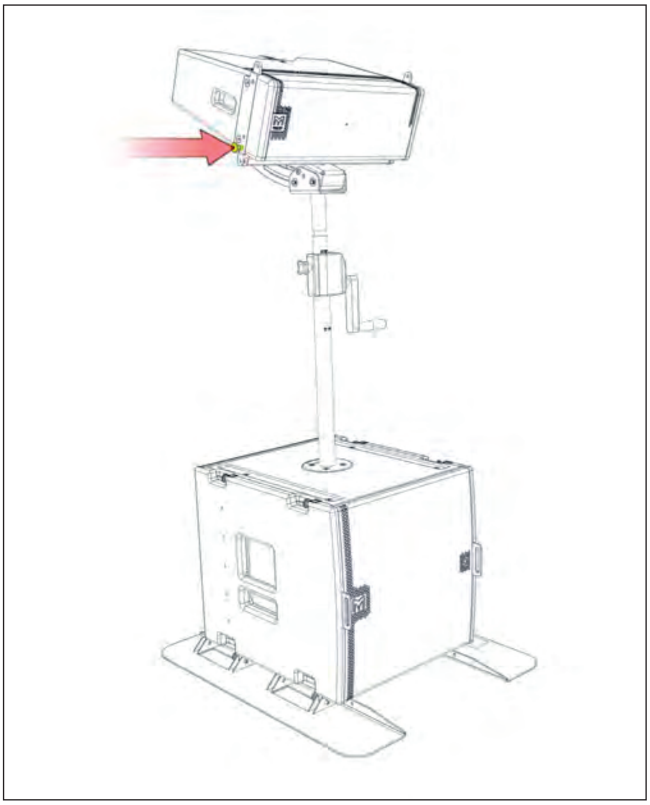


Fig.42 - insert rigging pin

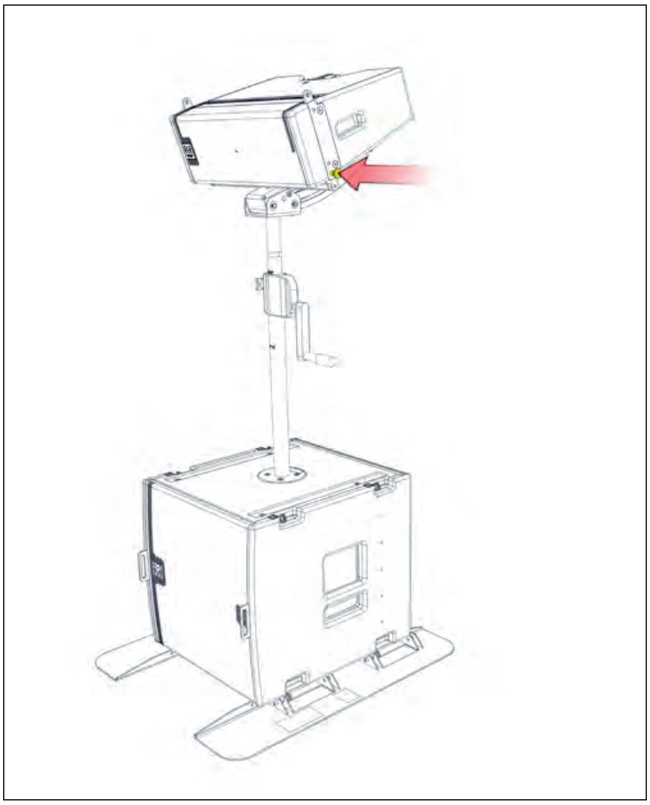


Fig.43 - insert rigging pin

- Attach the rear lug of the bracket to the Ground Stack hole (marked with a) in the cabinet's rear mounting plate. Secure with a Rigging Pin. Using the rear adjustment knob, set the tilt angle to the correct angle according to the DISPLAY software prediction; the angle can be seen by observing the calibration hole at the right-hand side.

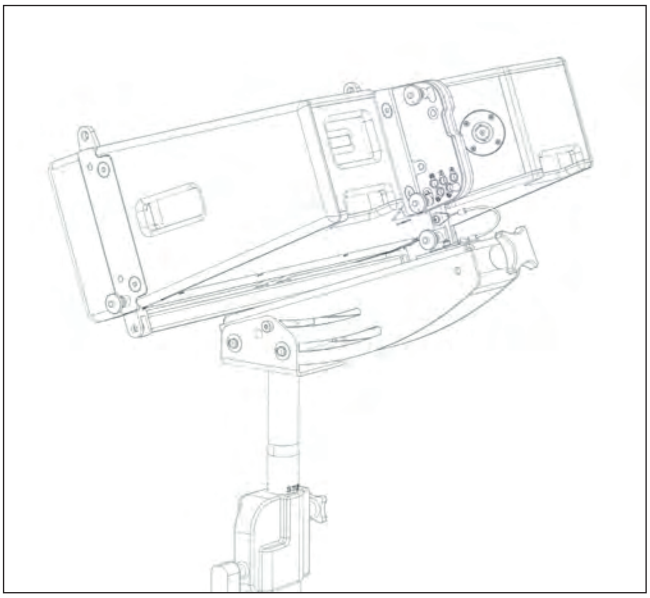


Fig.44 - attach first cabinet

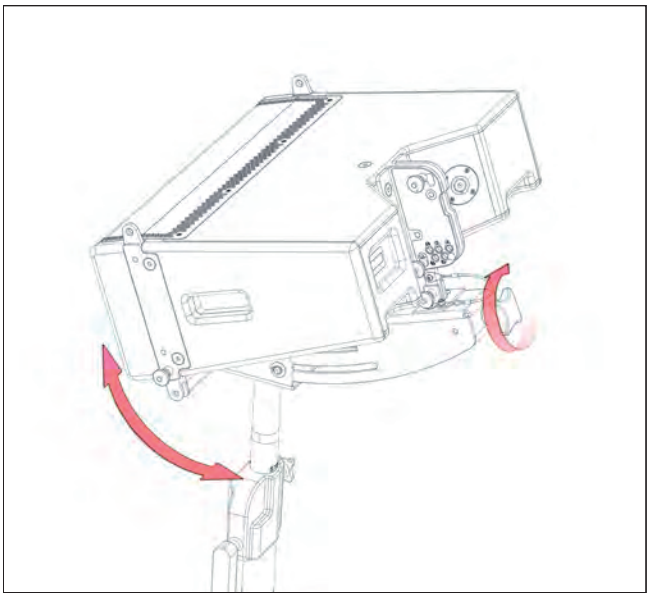


Fig.45 - angle Universal Bracket

- Lift the next cabinet on top of the previous one and secure both the front corners with further Rigging Pins. At the rear, rotate the upper cabinet’s mounting plate so that it engages with the slot in the lower cabinet’s bracket, and set the angle between the first and second cabinets by fitting a Rigging Pin in the appropriate hole on the lower bracket according to the DISPLAY software prediction.

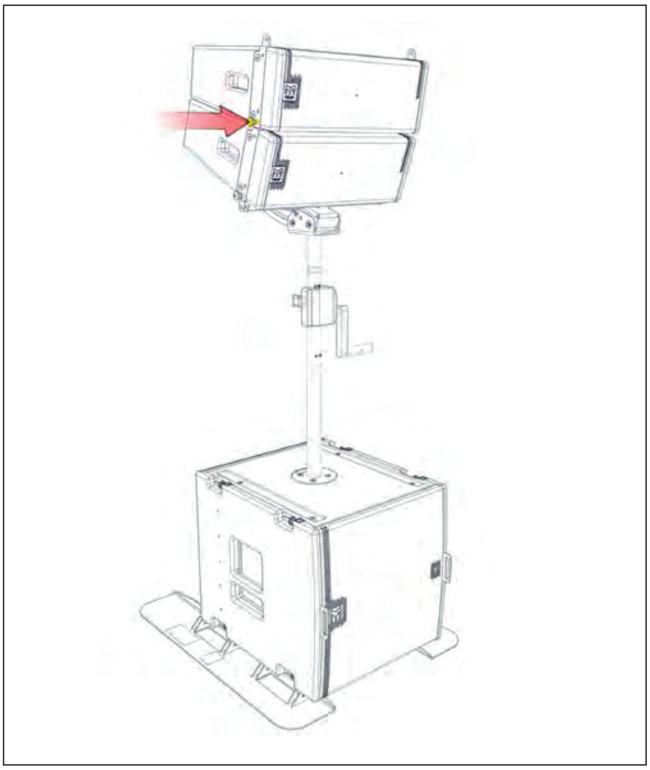


Fig.46 - insert rigging pin

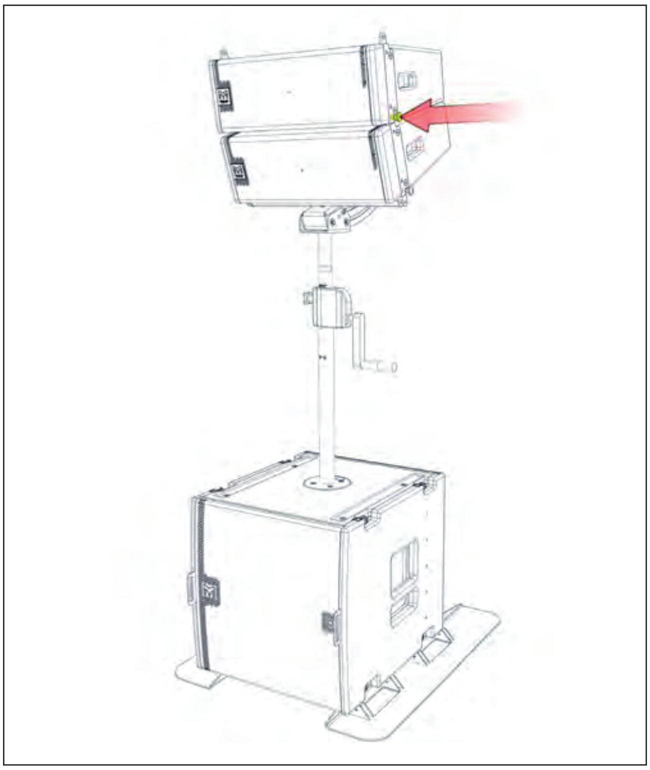


Fig.47 - insert rigging pin

- Repeat the previous steps twice to add the two remaining WPM cabinets, while referring to the angles which have been defined by the DISPLAY software. Take care to set the correct angles.
- The connections to the WPM array are most conveniently made at this stage.

- Depress the safety catch to unlock the height adjustment, and turn the handle to raise the telescopic pole mount so that the vertical distance between the front lower edge of the bottom WPM and the level that the MSX Passive is standing on is at the height defined by the DISPLAY software. Lock it in place by tightening the knob on the opposite side of the pole from the handle.

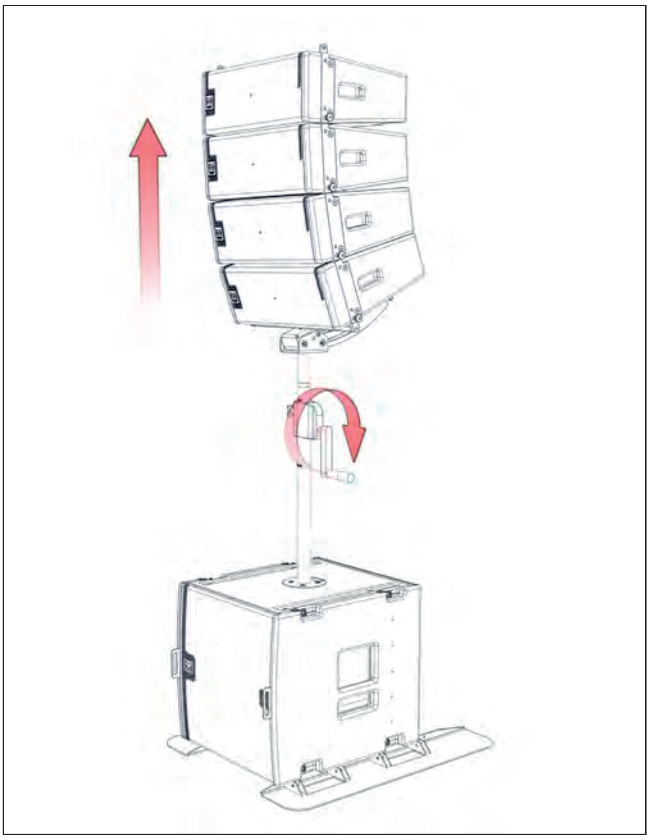


Fig 48 - raise array

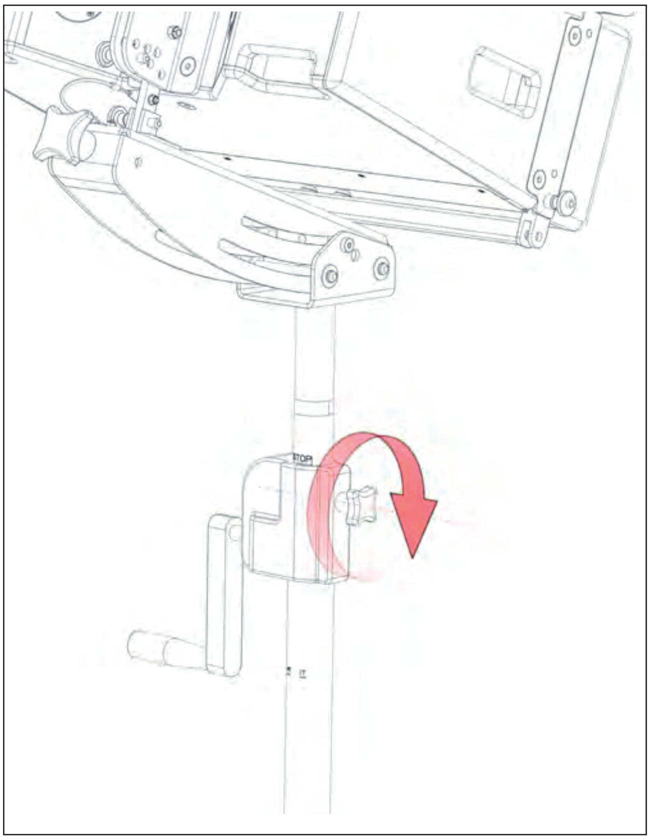


Fig.49 - lock pole mount

Flown WPM Array using the Universal Tilt Bracket

A four-cabinet WPM array can be flown from a truss with a scaffold clamp using the Universal Tilt Bracket. It is used inverted (relative to its use with the Pole Mount) with a standard scaffold clamp attached to its 13 mm fixing hole instead of the boss that secures it to the Pole Mount.

Note that 4 x WPM is the ONLY configuration that may be flown using this method; all other configurations MUST employ the Flying Frame.

- Remove the Pole Mount boss from the Universal Tilt Bracket (if one is attached). Attach a standard scaffold clamp to the bracket's fixing hole with an M12 (1/2") nut and bolt.

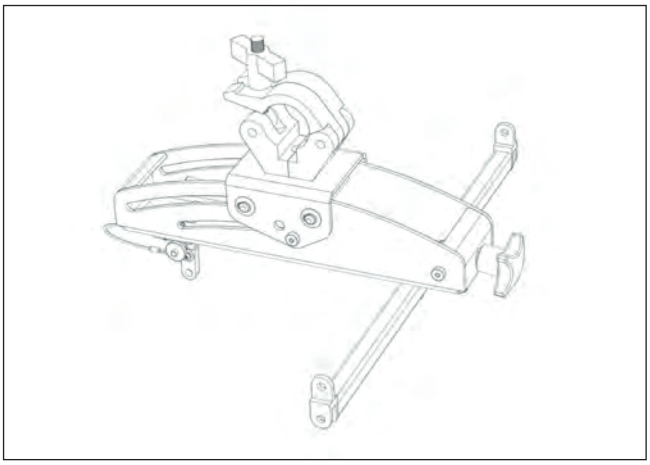


fig 50 - attach scaffold clamp

- Start with the four WPM cabinets face down on their flightcase base. The cabinets should be locked together with Rigging Pins at the front and rear, with the rear pins in the 0.5° position so that the four cabinets form a 'flat' array. Attach the Universal Tilt Bracket to the top of the first WPM. The lugs on the ends of the main cross-arm should mate with the slots in the front corners of the cabinet. Secure these points with Rigging Pins.

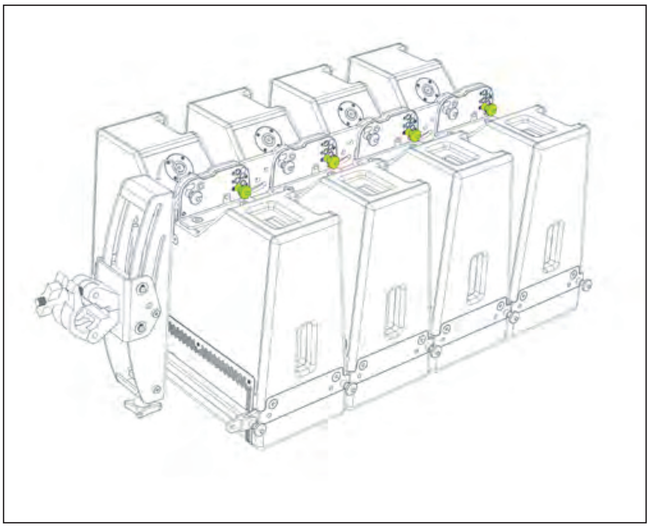


Fig 51 - flat WPM array

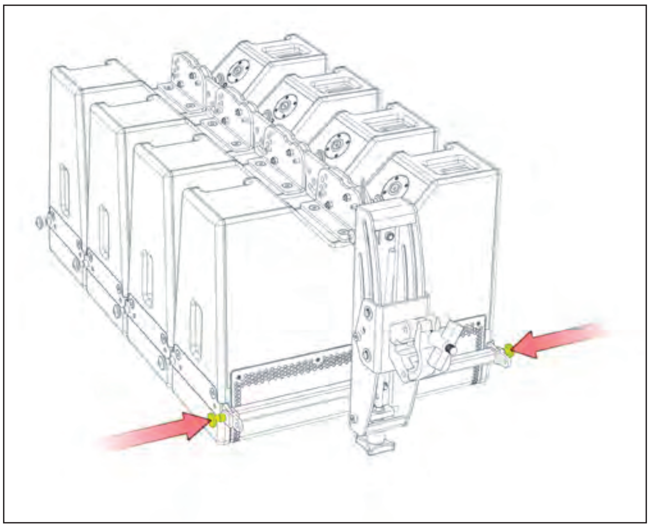


Fig.52 - secure universal bracket

- Attach the rear lug of the bracket to the Ground Stack hole in the cabinet's rear mounting plate. Secure with a Rigging Pin.

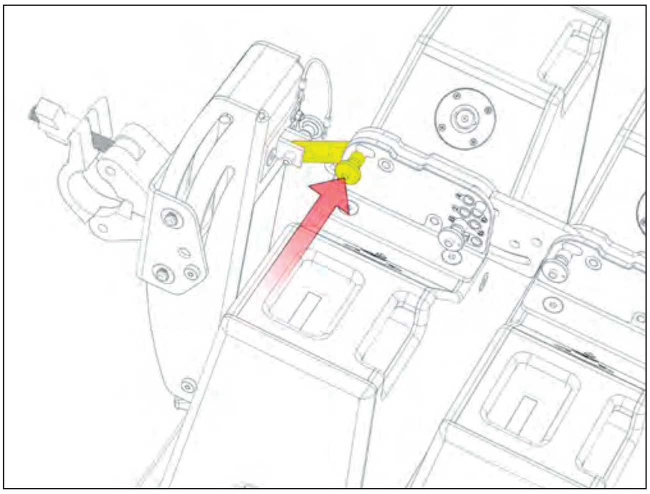


Fig 53 - attach rear lug

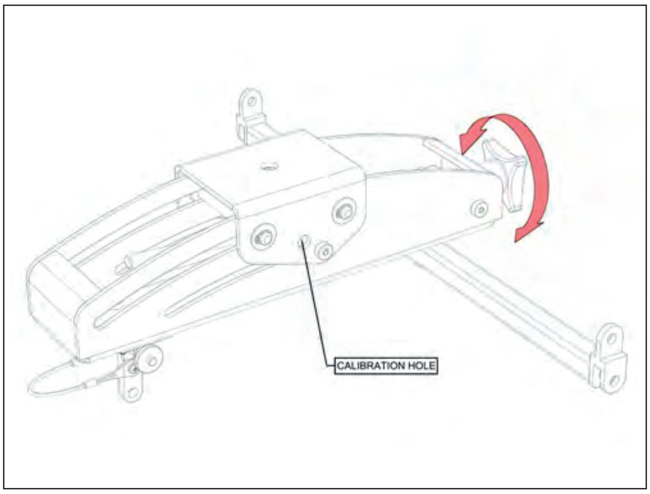


Fig.54 - adjust tilt angle

- Using the rear adjustment knob, set the tilt angle to the angle defined by DISPLAY 2.3. The angle can be seen by observing the calibration hole at the right-hand side.
- Lift the four-cabinet array and suspend it from the truss or scaffold pole by the trigger clamp. How this is best achieved will depend on the venue and other circumstances on the day. The easiest solution, wherever possible, is to lower the scaffold pole or truss section from which the array is to be flown to a sensible working height, attach the array and raise the pole/truss back up to the height specified by the DISPLAY prediction. If this option is not available, a mechanical hoist (e.g., Genie or picker) or adequate manpower can be employed. Ensure that the T-clamp is tightened.

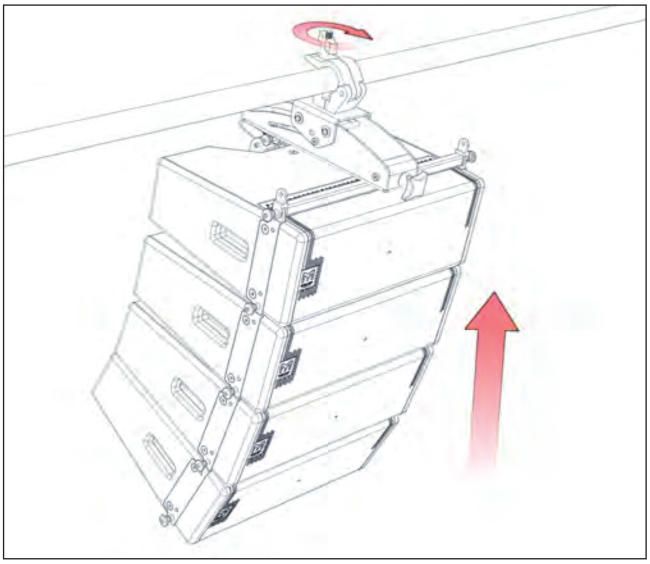


Fig 55 - raise array

- If easy access is available to the array at its flown height, it is probably better to leave connecting the cabinets up until the array has been raised to height, as hanging cables may constitute a hazard. However, if it is easier to connect up at ground level, perform this step next.
- As the array is being raised, and as the cabinets reach a suitable height, set each of the inter-cabinet angles in turn. Refer to the data from the DISPLAY software prediction.
- The correct height for the array will be defined by the DISPLAY software prediction, measured from the stage or other floor to the bottom of the lowest cabinet.

Fully Flown WPM Arrays

WPM cabinets can be combined with MSX Passive subwoofers to form full-range flown arrays in two possible configurations: twelve WPM cabinets plus three MSX Passive subwoofers, or a subwoofer-only configuration of up to eight MSX Passive.

The MLA Mini Flying Frame is used to support the full array. Fully flown systems always have the subwoofers at the top of the array, with the WPM cabinets suspended underneath from a Transition Frame attached to the lowest subwoofer. The example illustrated here is an array of two MSX Passive subwoofers and eight WPM cabinets.

- With an MSX Passive subwoofer on its wheelboard, begin by attaching the Flying Frame to the cabinet. Extend the four dropdown brackets on the Flying Frame and engage them into the four slots in the top of the sub. The front edge of the Flying Frame should be aligned with the front face of the MSX Passive. Secure in place with four Rigging Pins.

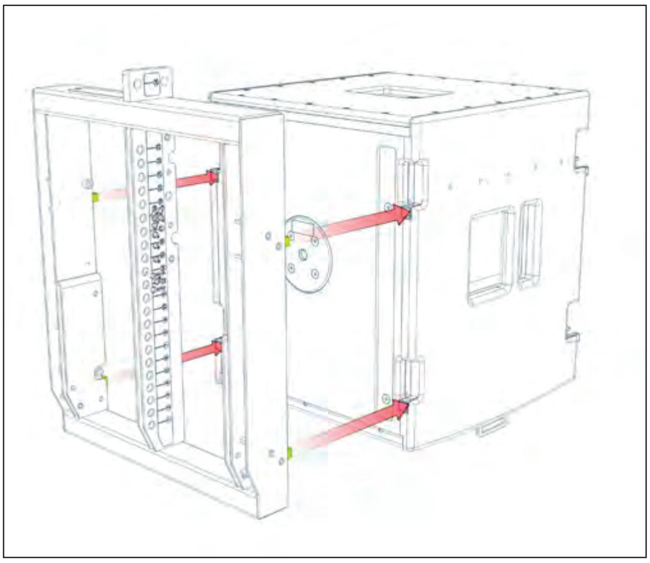


Fig.56 - attach flying frame

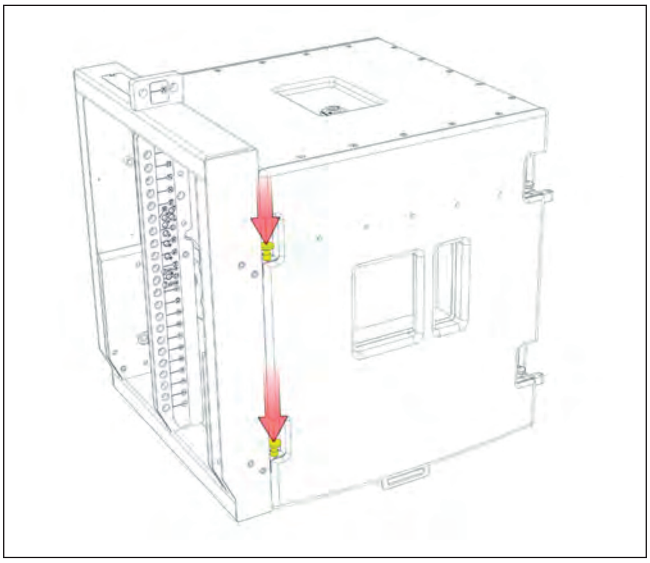


Fig.57 - secure flying frame

- Attach the suspension cable(s) to the Flying Frame using shackles. If using single-point suspension, attach the chain hoist to the suspension hole of the Flying Frame indicated in DISPLAY 2.3 and raise the MSX Passive upwards. With two-point suspension, attach the hoists to the front and rear suspension points. Raise the hoist(s); remove the wheelboard when it is clear of the ground.

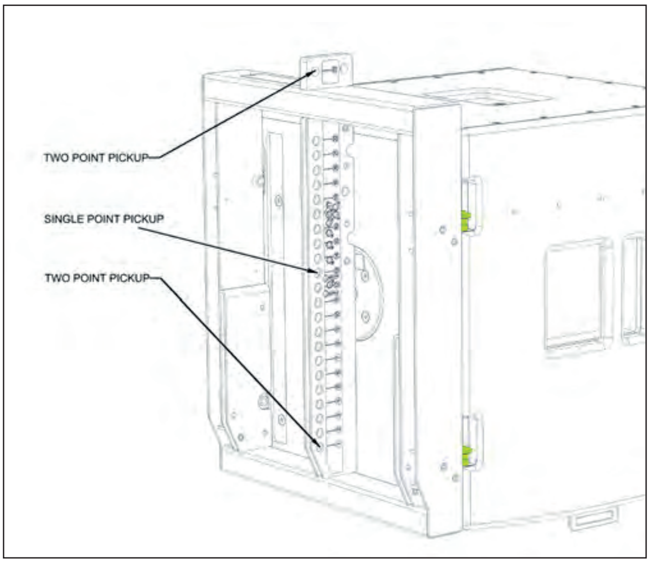


Fig.58 - attach suspension cables

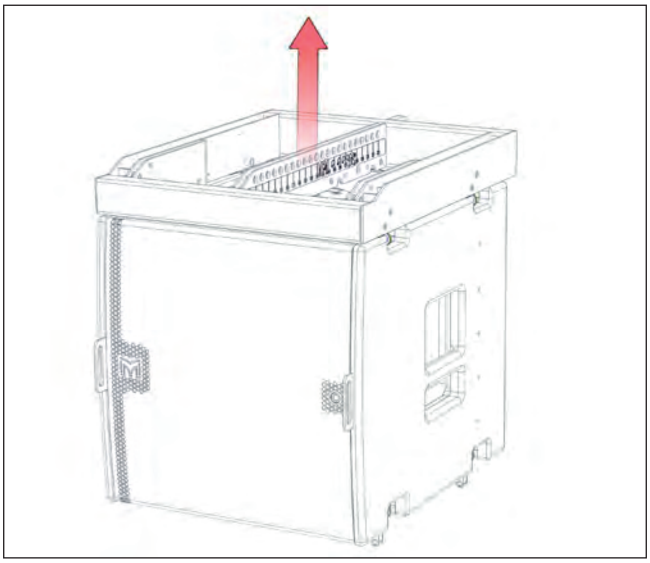


Fig.59 - lift frame and subwoofer

- Wheel the second MSX Passive subwoofer into position so that its top face is aligned with the bottom face of the first subwoofer. Extend the dropdown brackets from the bottom of the first subwoofer and engage them with the four slots in the top of the second. Secure the dropdown brackets with Rigging Pins.

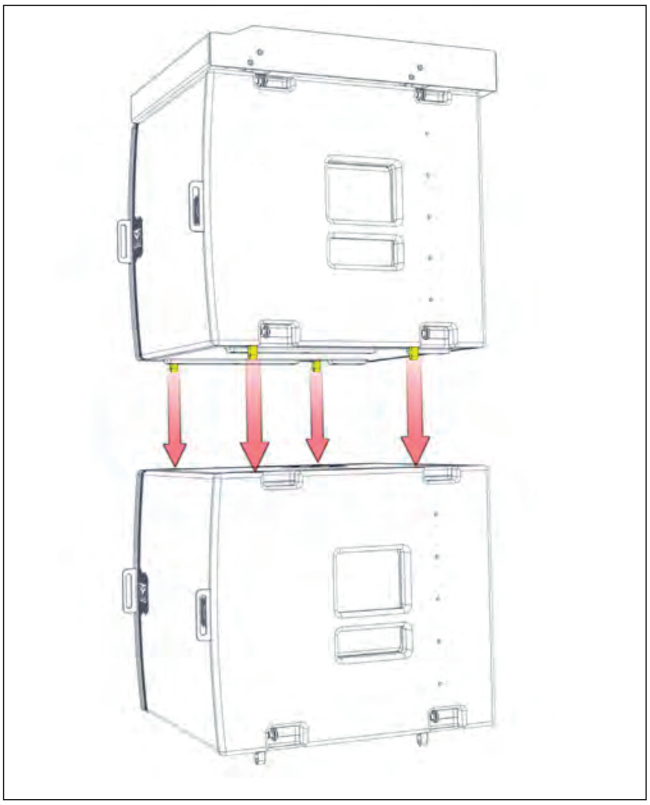


Fig.60 - attach second subwoofer

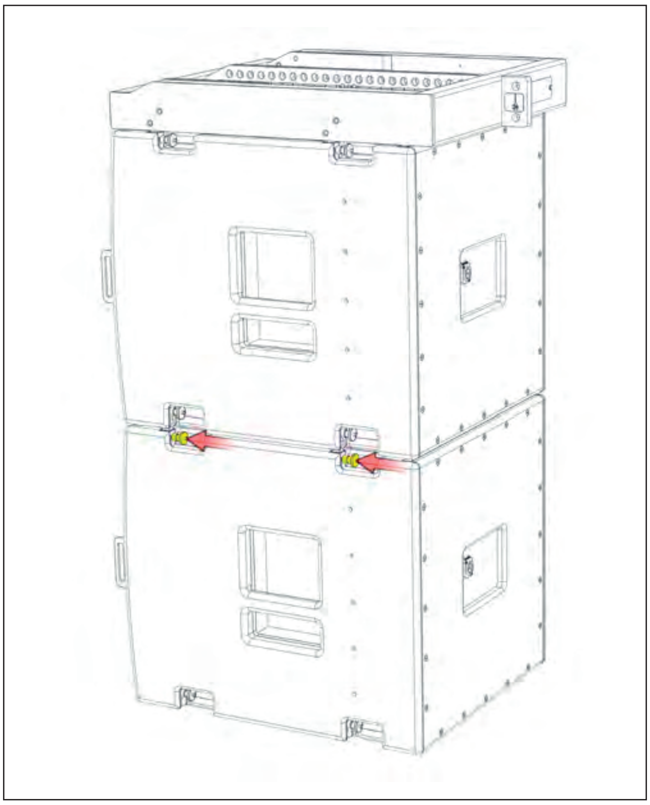


Fig.61 - secure second subwoofer

- Position the Transition Frame below the lowest of the suspended MSX Passive subwoofers. Attach the Transition Frame by extending the dropdown brackets of the subwoofer and engaging them with the four slots in the top of the Transition frame. Secure with four Rigging Pins.

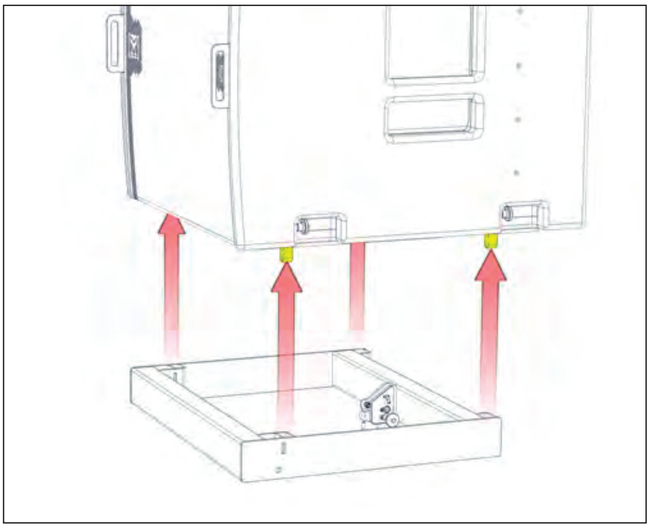


Fig.62 - attach transition frame

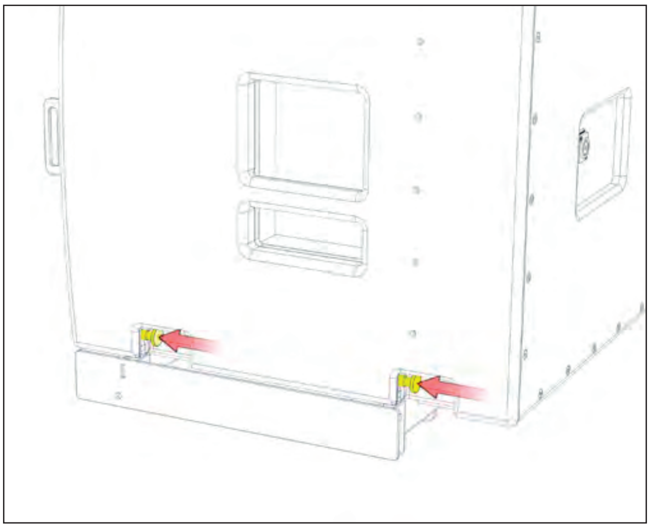


Fig.63 - secure transition frame

- Assemble the first block of four WPM cabinets face down on their flightcase base. Pre-select inter-cabinet angles as predicted by the DISPLAY software.

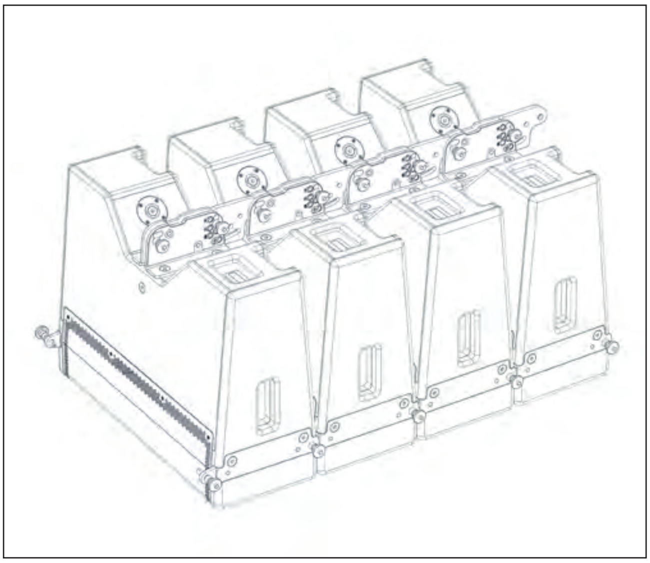


Fig.64 - assemble four cabinets

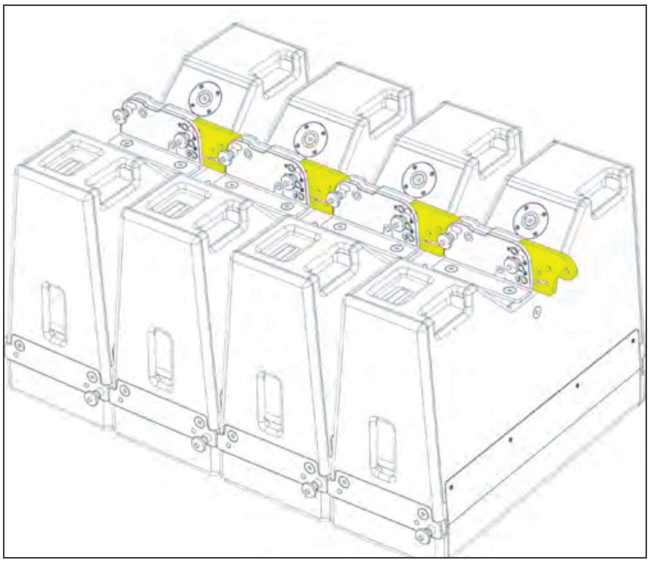


Fig.65 - preselect angles

- Attach the Transition Frame to the upper WPM cabinet. Connect the frame at the rear, where the swinging arm can mate with the upper section of the cabinet rear bracket in three positions to produce an angle between the Transition Frame and the WPM of 0°, 2.5° or 5°. Set the angle defined by the DISPLAY software. Secure with a Rigging Pin.
- Gradually raise the chain hoist; this will swing the four WPMs up and free of the flightcase base. As the array ascends, steady the array until it is completely free of the flight case. Rotate the array forwards until the front rigging positions on the upper cabinet are aligned with the WPM pickup points on the Transition Frame. Secure with Rigging Pins at each side.

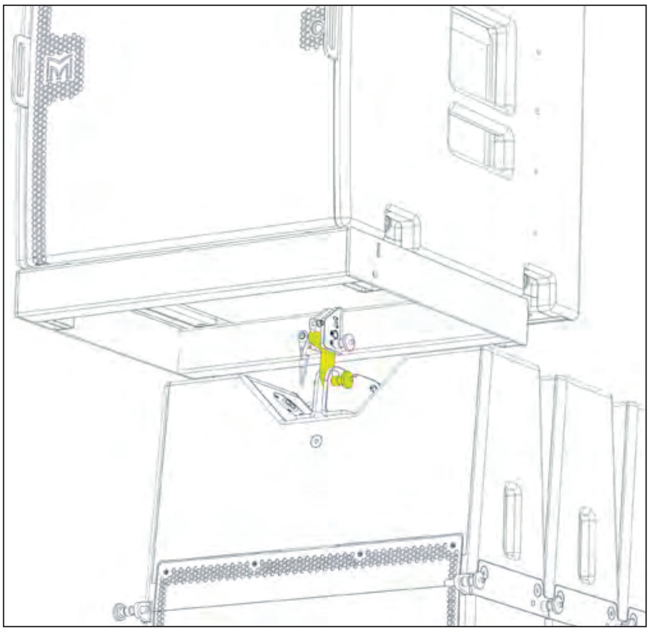


Fig.66 - attach first four cabinets

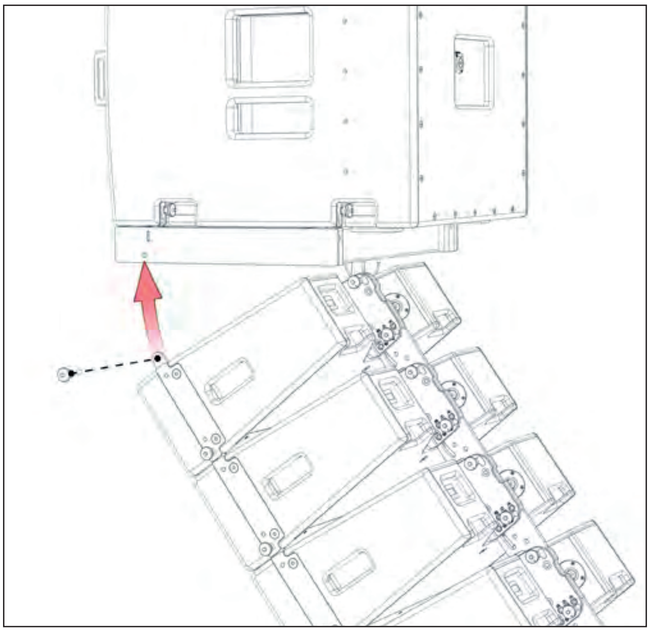


Fig.67 - rotate array

- The connections from the amplifiers to the MSX Passive(s) and the first set of four WPMs are most conveniently made at this stage.
- Wheel the next set of four WPM cabinets on their flightcase base into position below the suspended array. Adjust the hoist and the flightcase base so that the lowest cabinet in the array is in a convenient position to be mated with the top cabinet in the next set of four cabinets. Attach the front of the two cabinets with Rigging Pins.

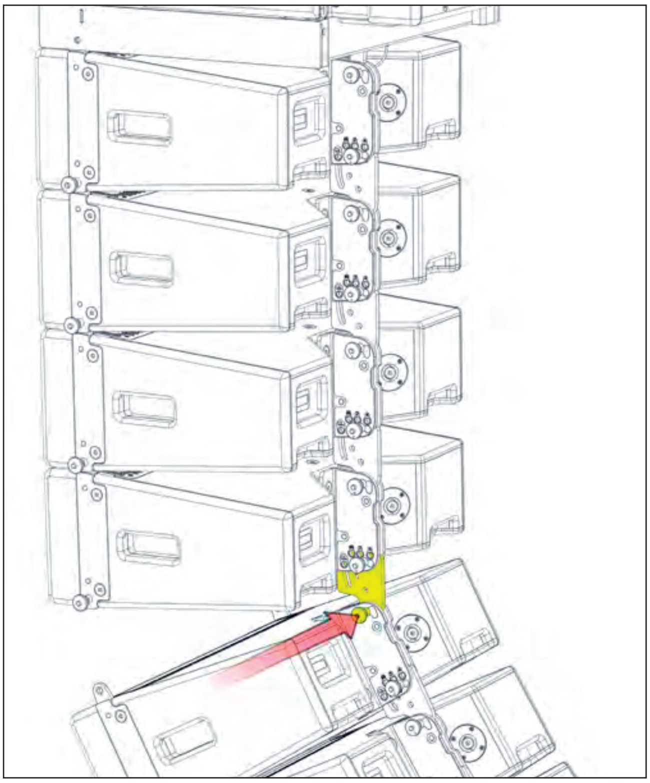


Fig.68 - attach second block

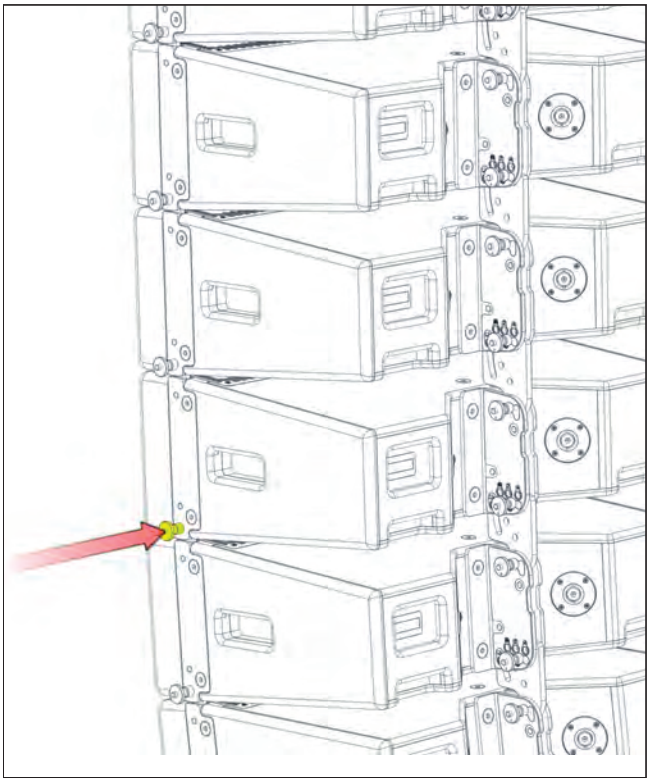


Fig.69 - secure second block

- Raise the hoist further to bring the next set of WPMs off the flightcase base. As they rise up, set the correct inter-cabinet angles (refer to the DISPLAY data) at the rear fixing with Rigging Pins as before.
- Continue raising the array on the hoist until the lower edge of the bottom WPM cabinet is at the height defined by the DISPLAY software. If the Flying Frame tilt angle is fitted with an inclinometer, the tilt can be checked with the inclinometer display. If a single hoist attachment is being employed, the suspension employed will ensure that the array’s centre of gravity will set the tilt at the correct angle. If using two hoists, adjust the rear relative to the front to set the back-to-front tilt to the angle defined by the DISPLAY software.

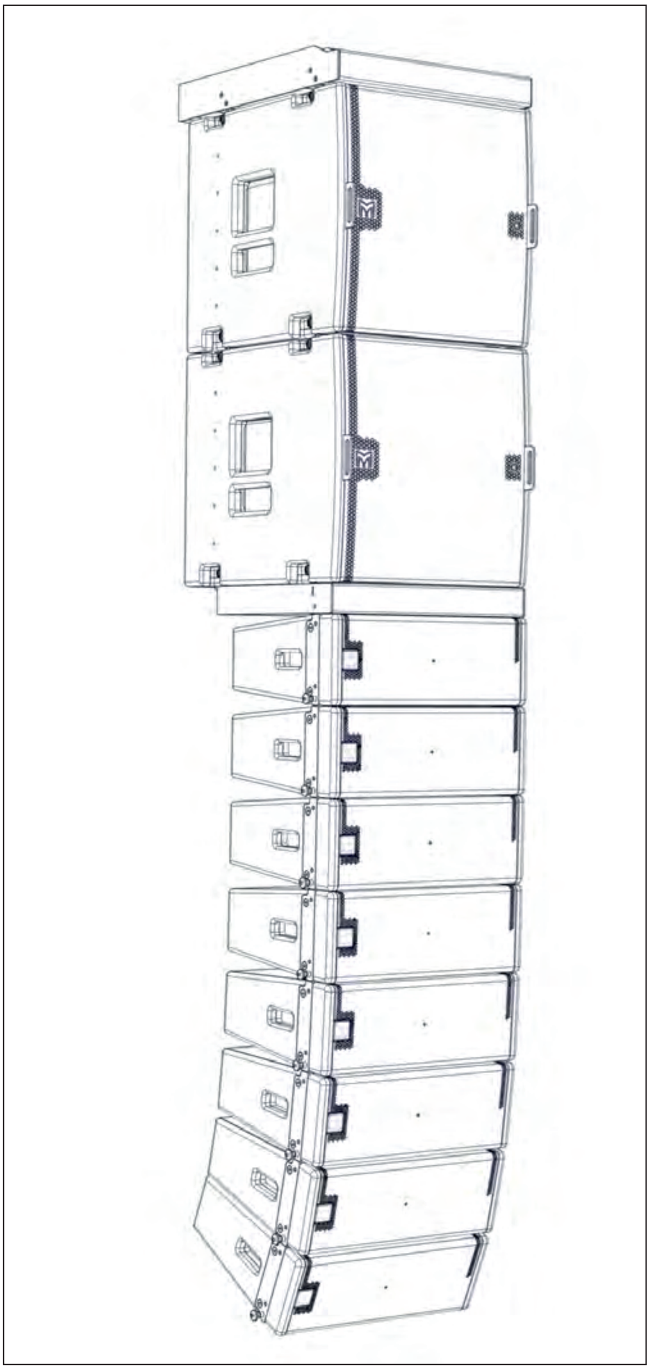


Fig.70 - complete array

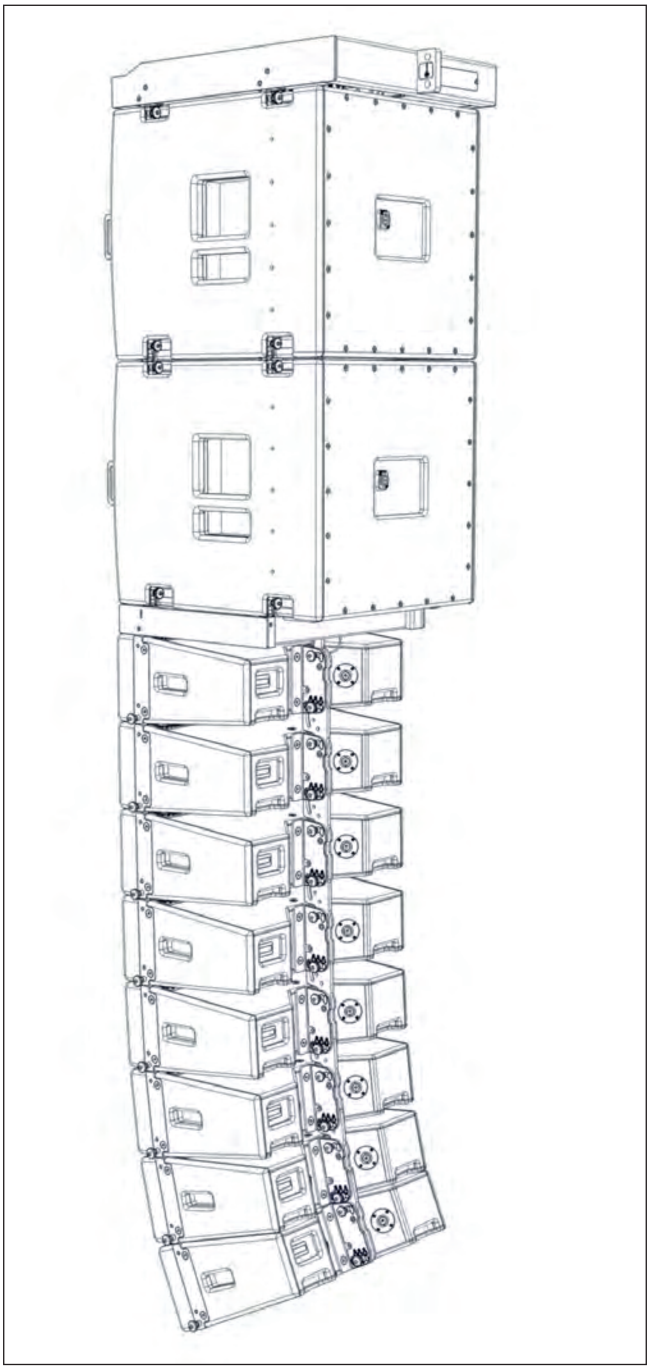
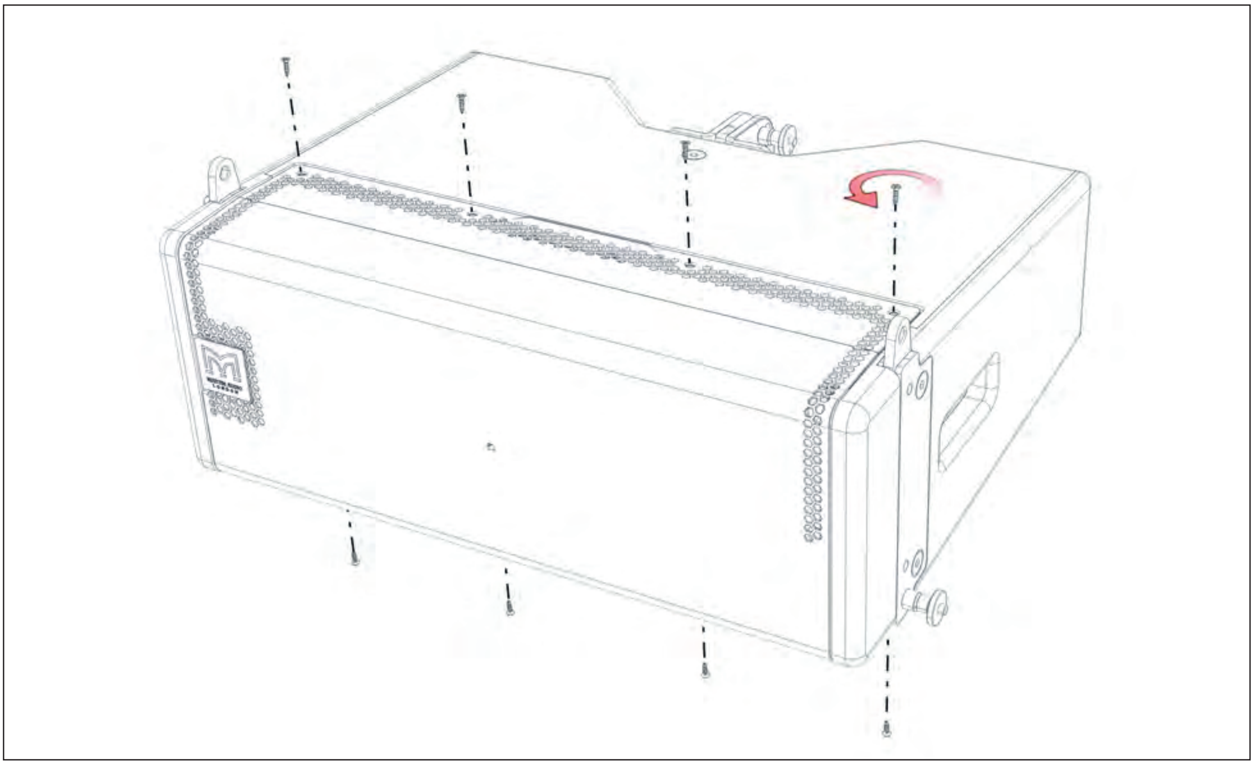


Fig.71 - complete array

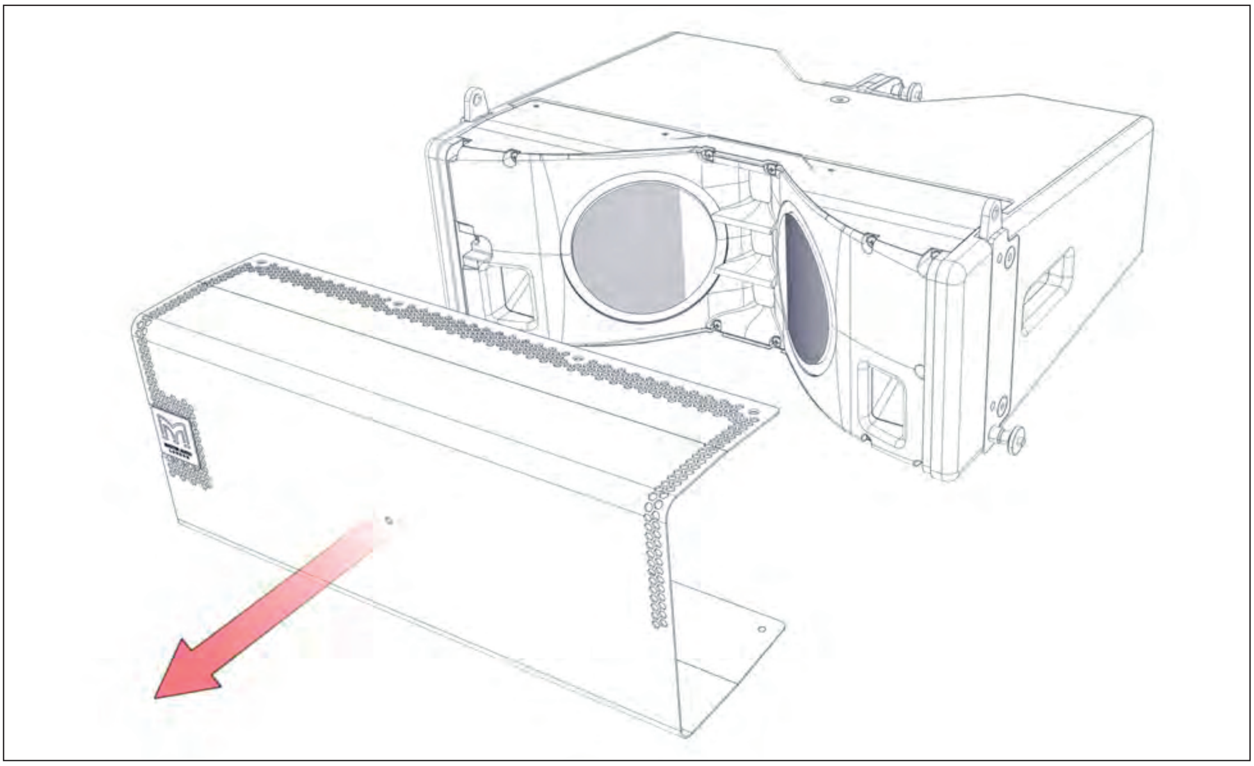
Essential Maintenance

WPM - Replacing a LF Drive Unit

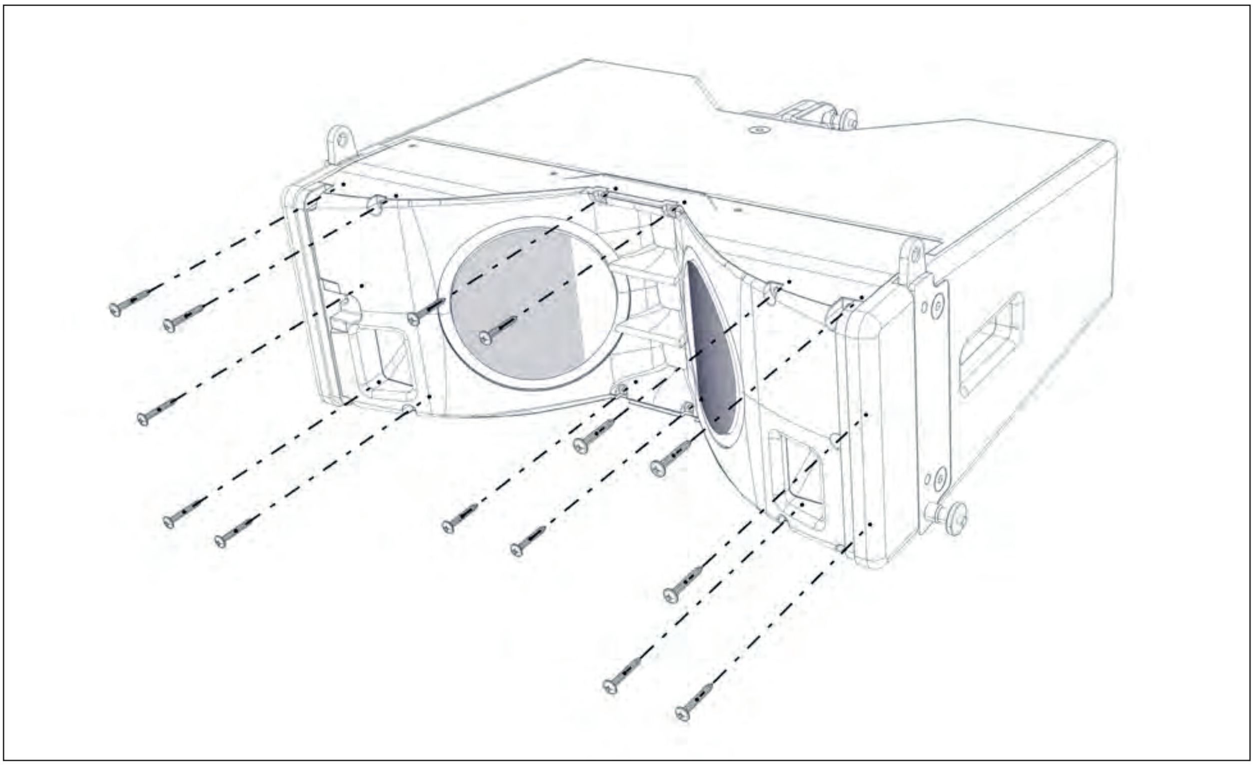
- To access the LF drive units first unscrew the eight M3 countersunk screws securing the loudspeaker grille



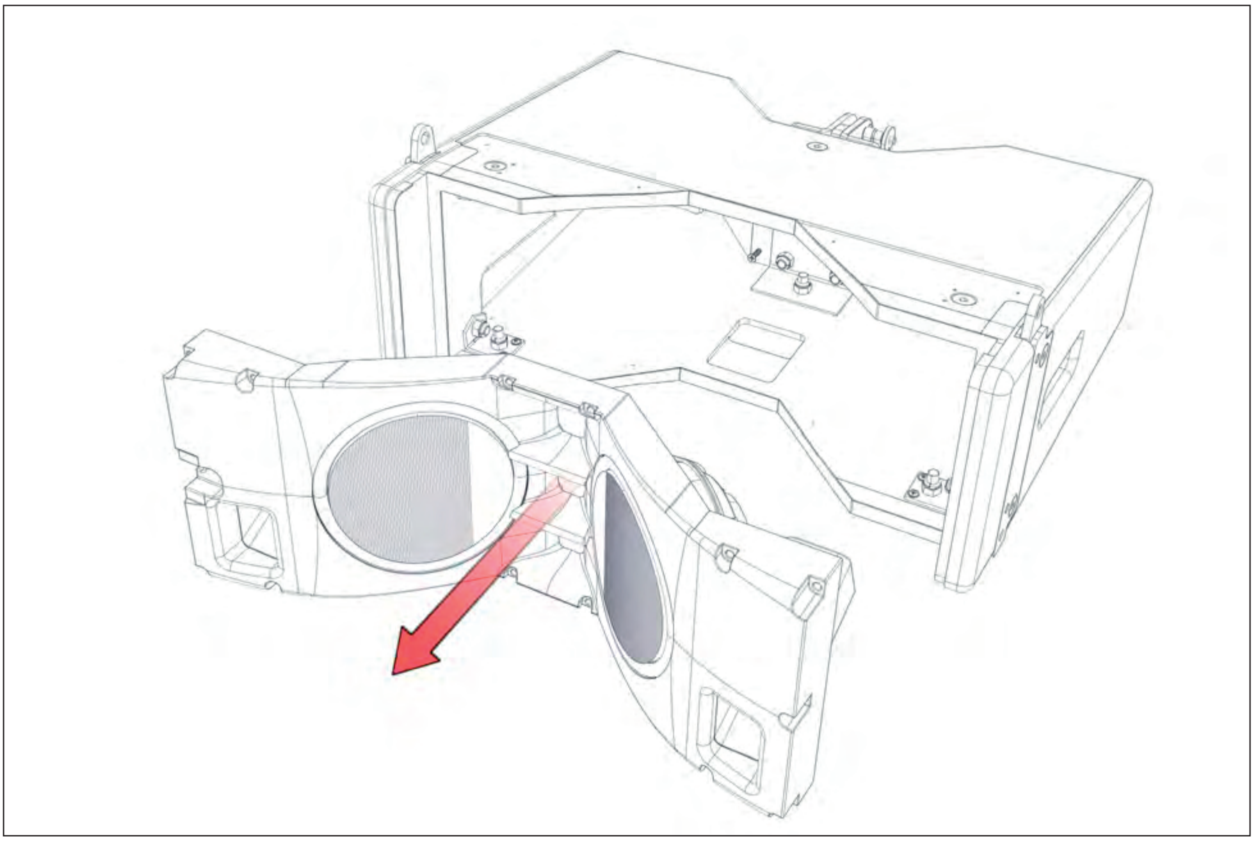
- Remove the grille and set it aside.



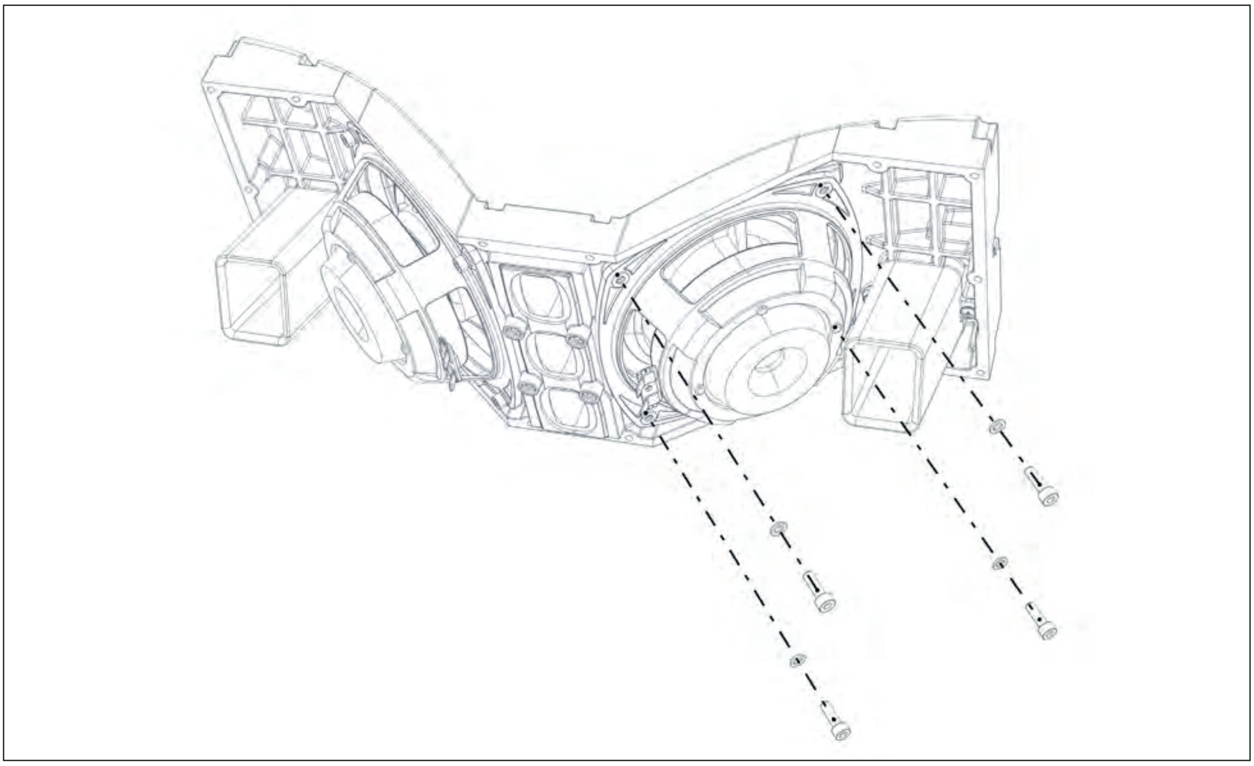
- Next remove the 14 No.8 flange screws holding the front moulding in place



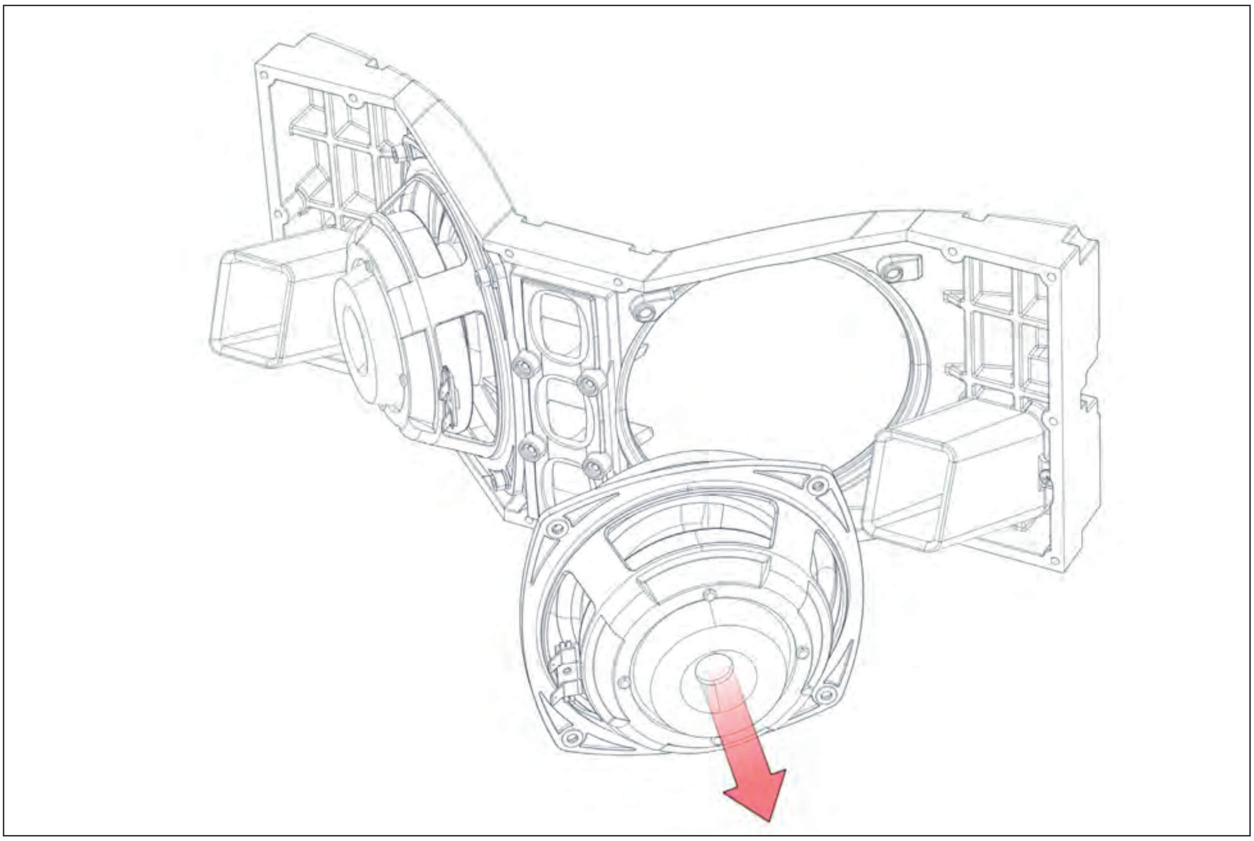
- Now remove the front moulding and LF drive unit assembly from the cabinet



- Remove the four M5 x 16 cap head screws and washers securing the LF drive unit.

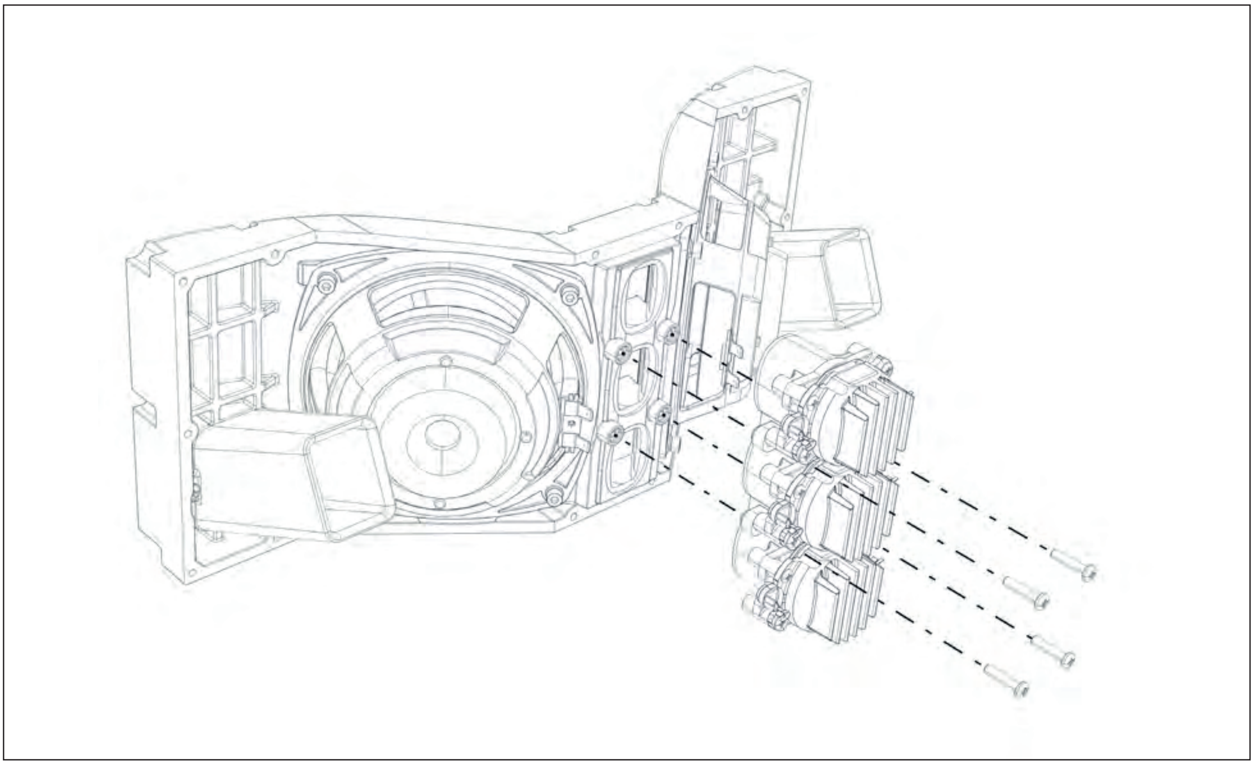


- The LF drive unit may now be lifted carefully out and away from the front moulding assembly for repair or replacement.

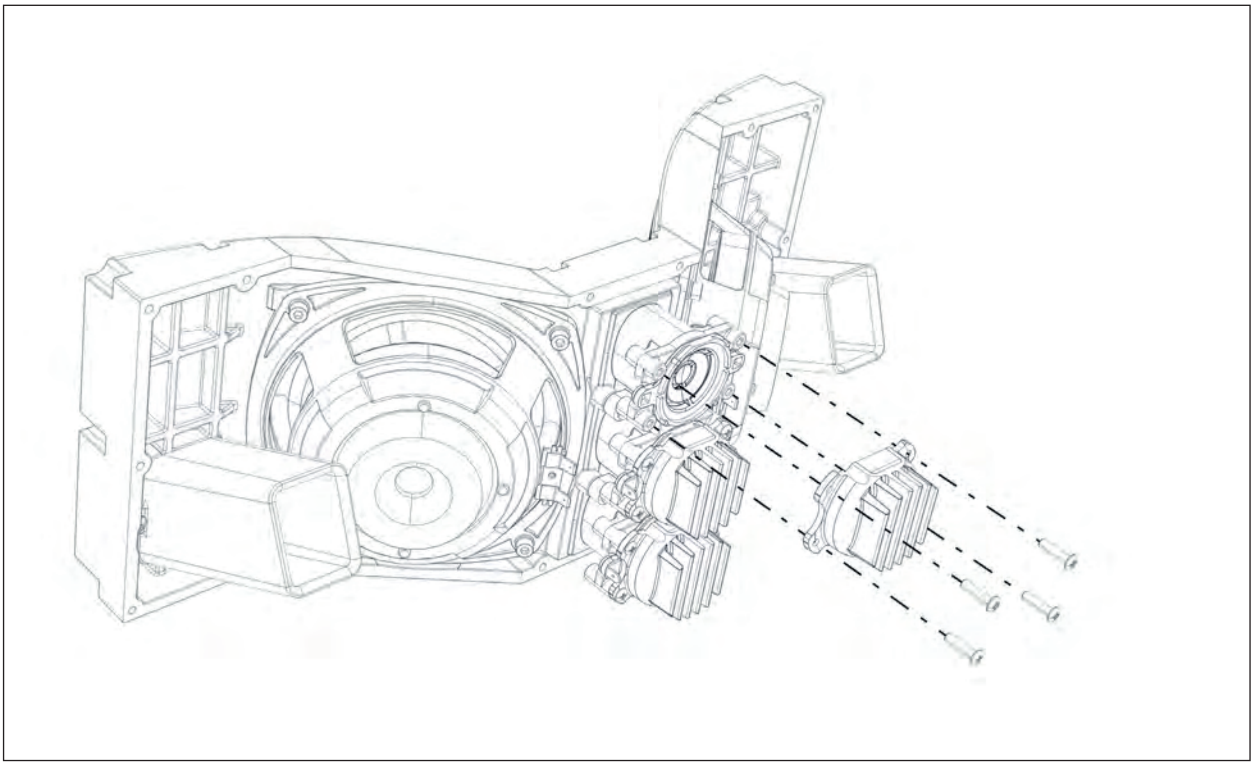


WPM - Replacing the HF Drive Units

- The HF section is composed of three discrete drivers in a complete HF horn assembly, and must be serviced or replaced as one assembly (part number DCD10006). Remove the 4 x No.8 Plasfix screws holding the HF horn assembly in place.

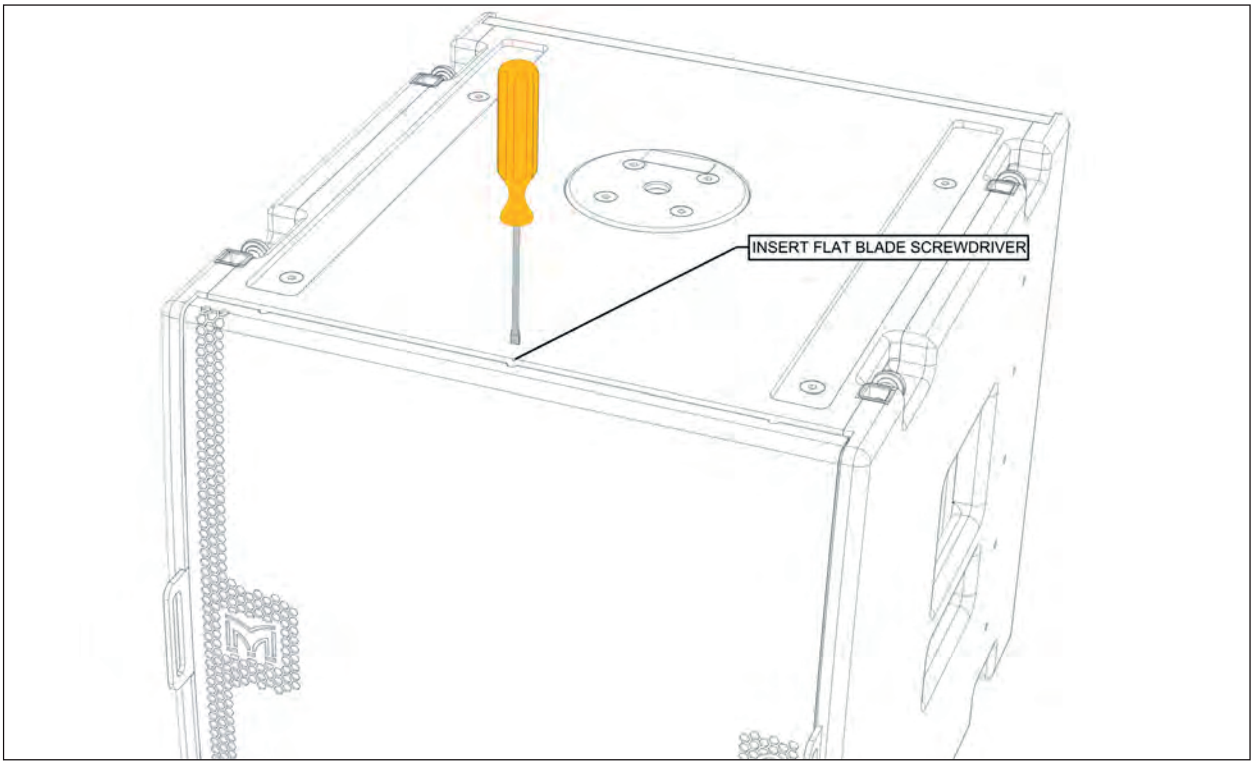


- To replace an HF diaphragm (part number DLZ10006), remove the four M4 x 16 screws securing the back cover.

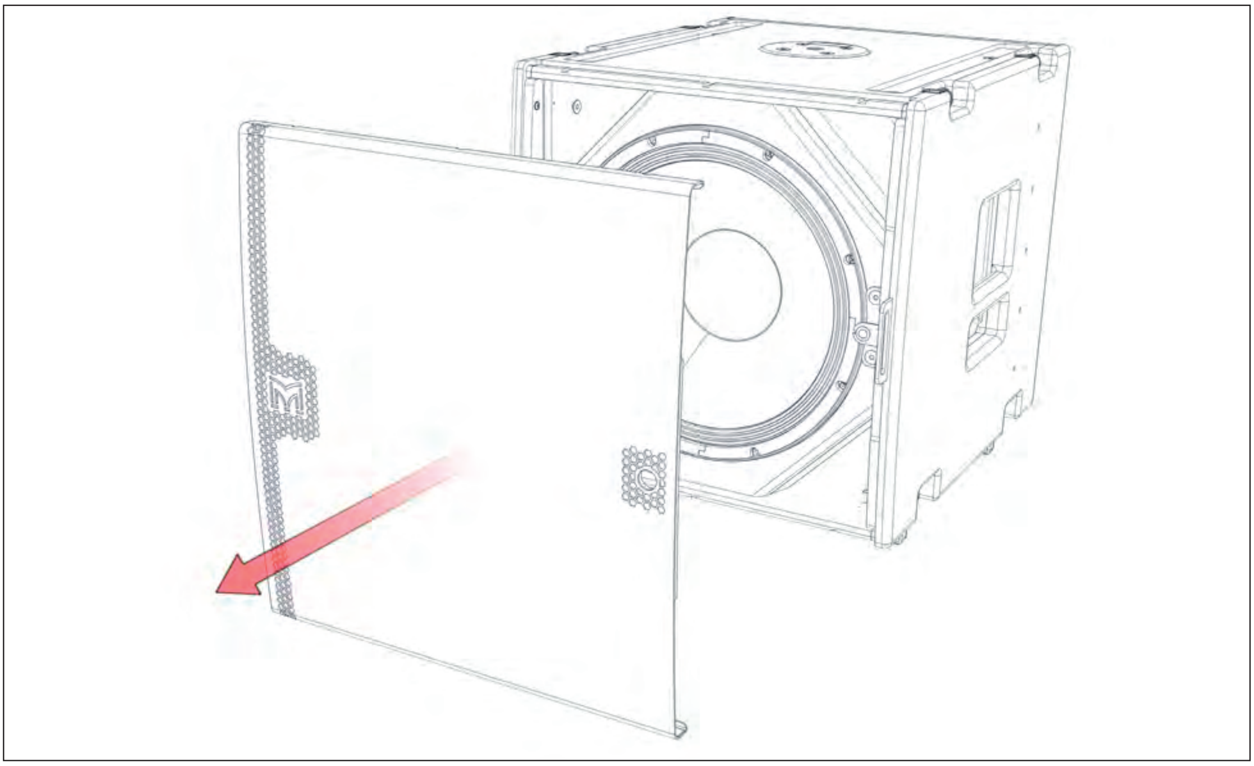


MSX Passive Subwoofer - Replacing the Drive Unit

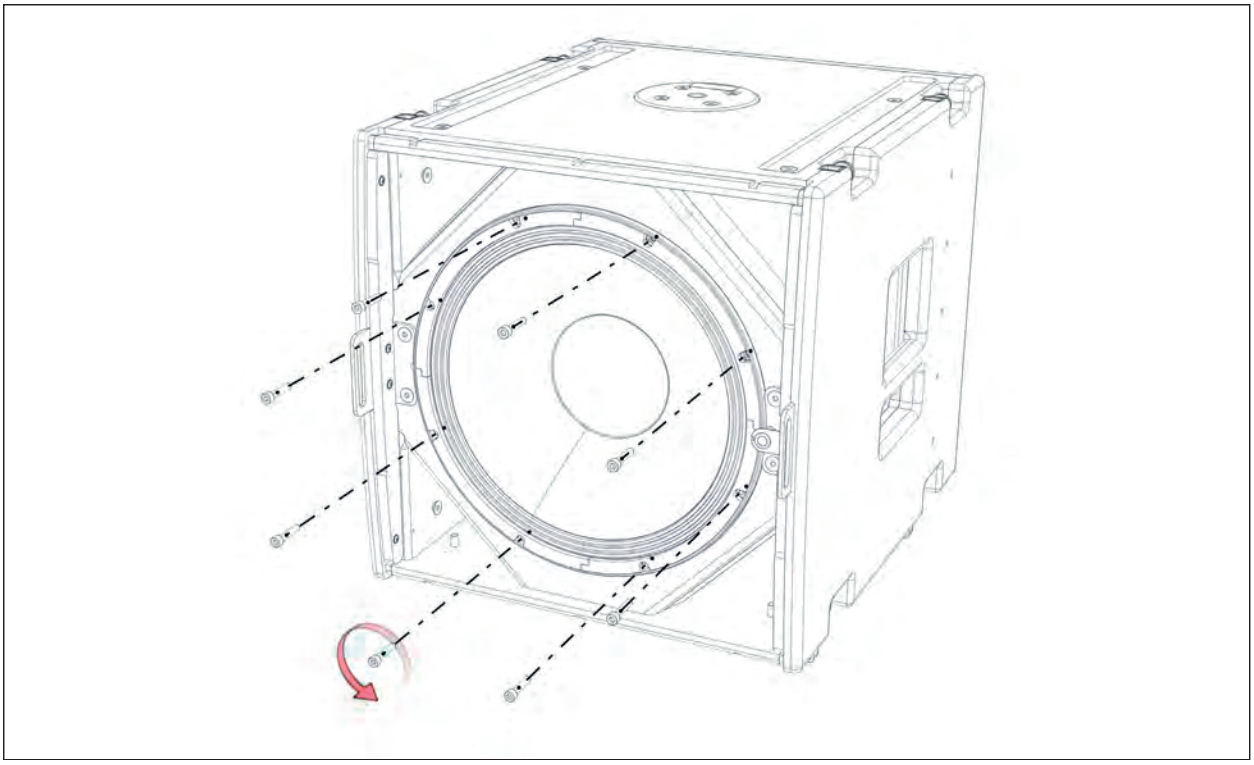
- The front grille locates into slots on the top and bottom of the cabinet. Remove it by inserting a flat blade screwdriver into slots in the grille edge and carefully levering it out of the slot.

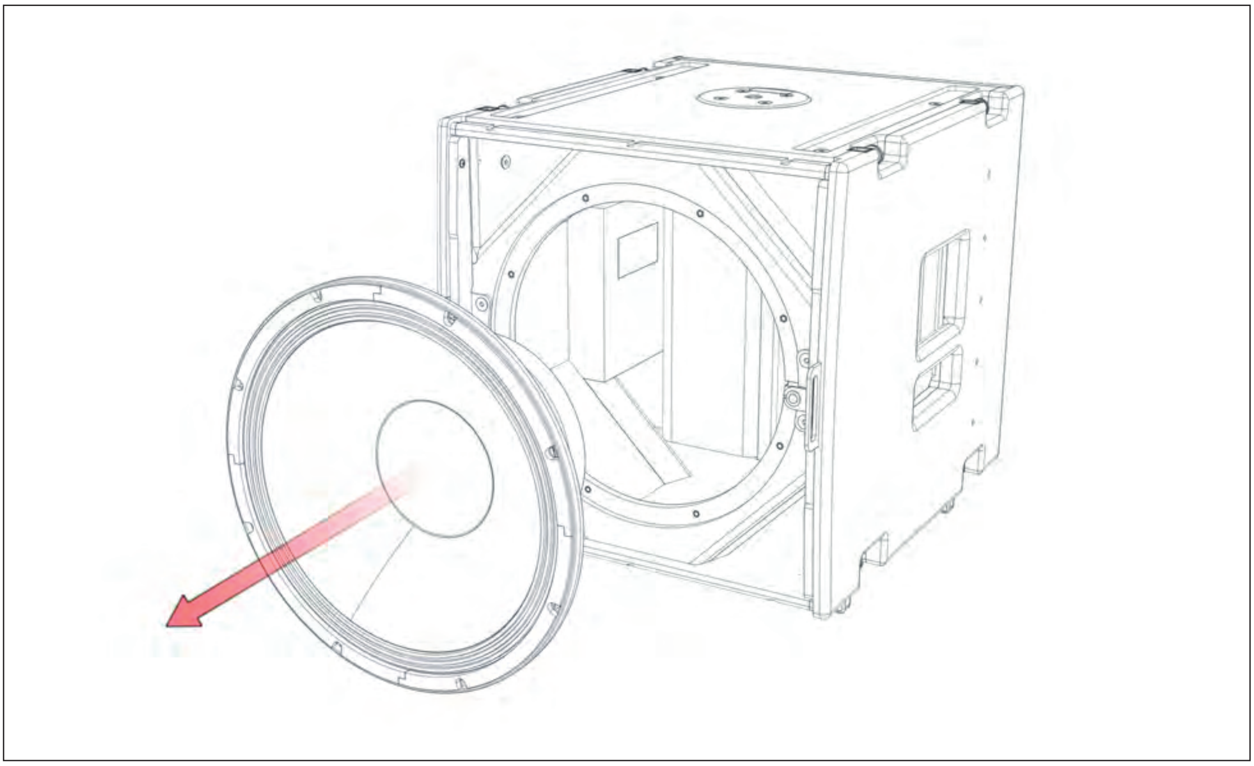


- Remove the grille and set it aside.



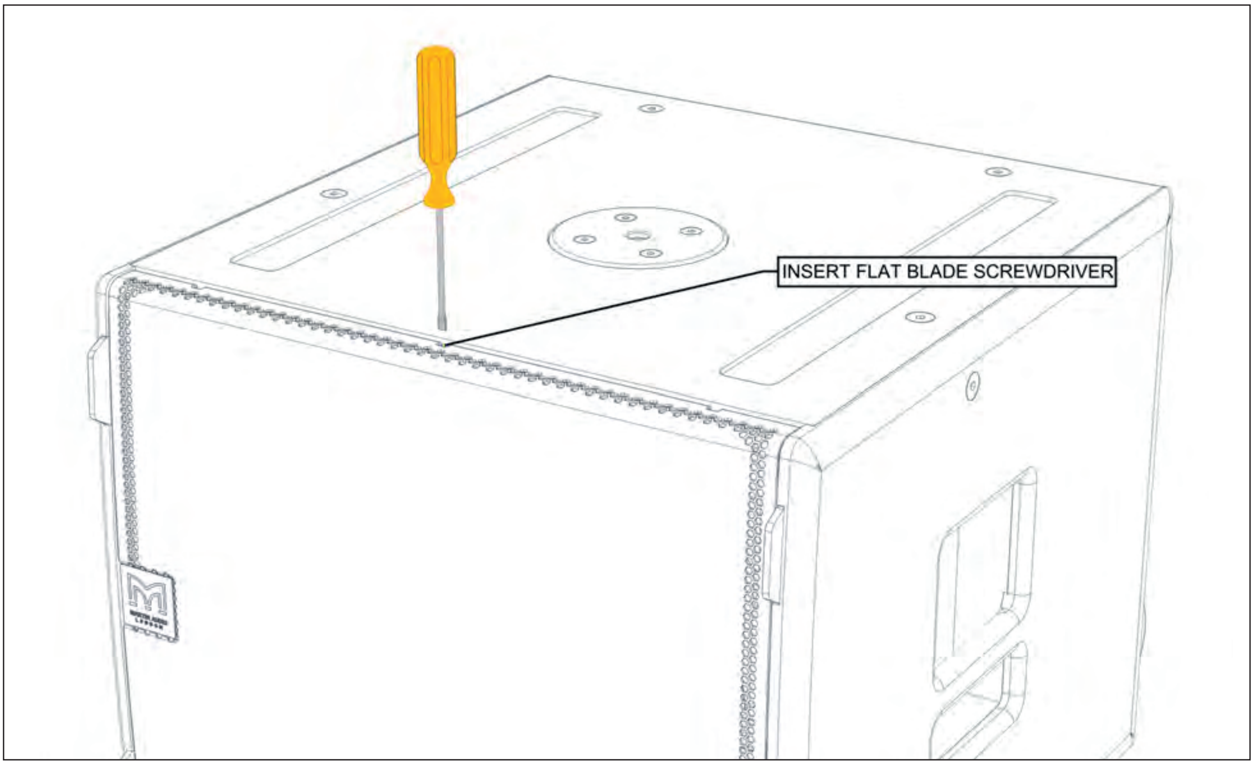
- Unscrew the eight M6 x 30mm bolts securing the drive unit. Carefully lift the drive unit out of the cabinet and disconnect the speaker cables, making note of the polarity for later reconnection.



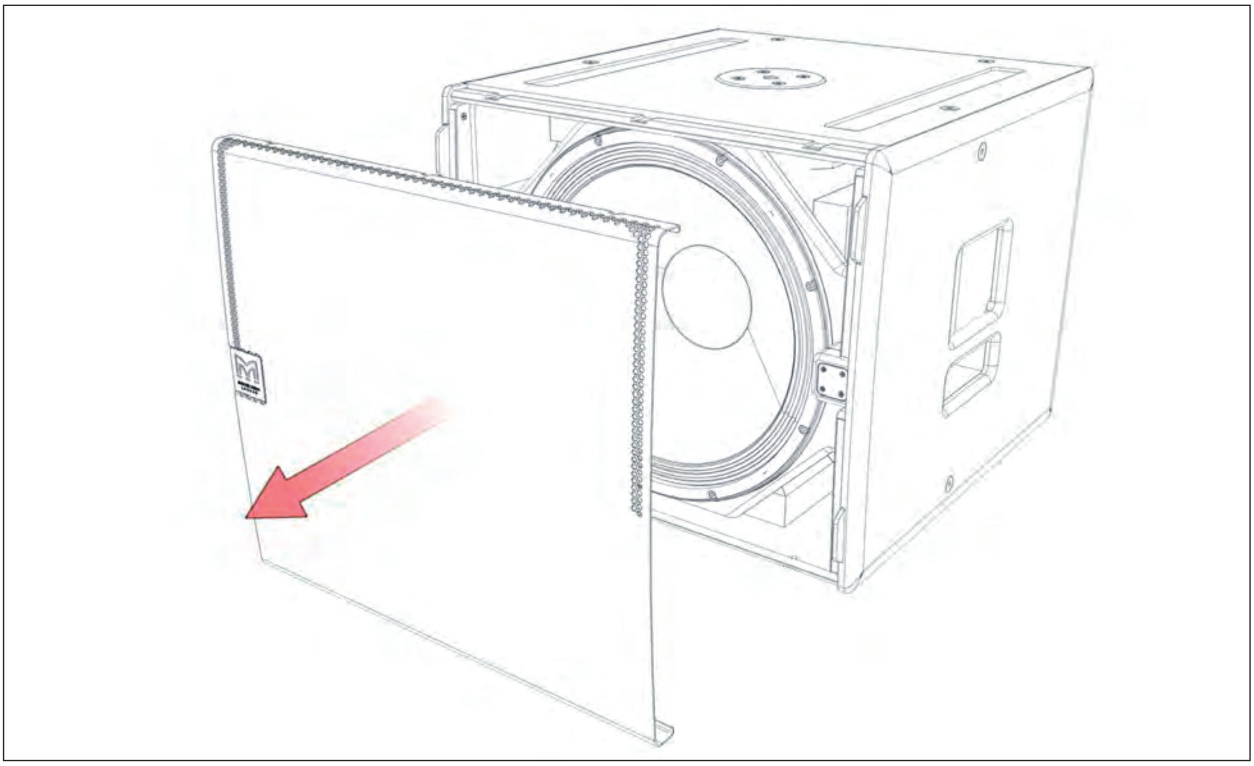


SX118 Subwoofer - Replacing the Drive Unit

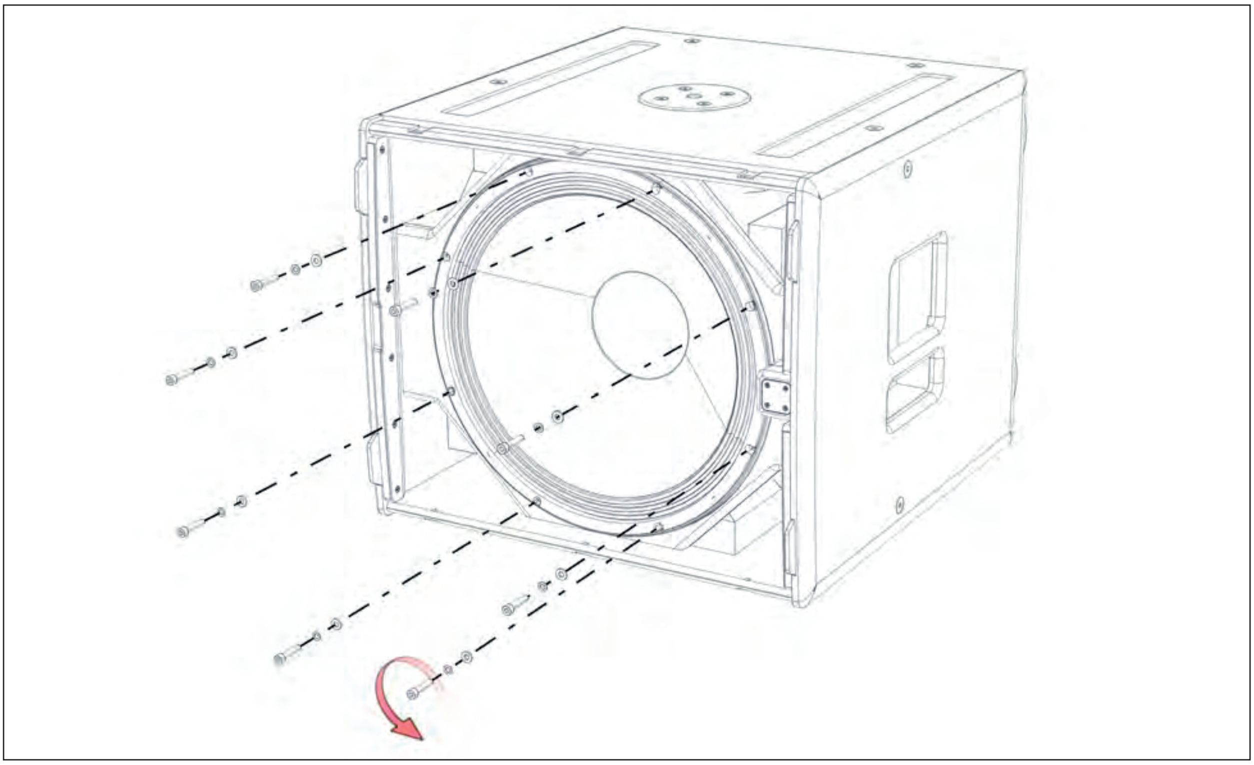
- The front grille locates into slots on the top and bottom of the cabinet. Remove it by inserting a flat blade screwdriver into slots in the grille edge and carefully levering it out of the slot.

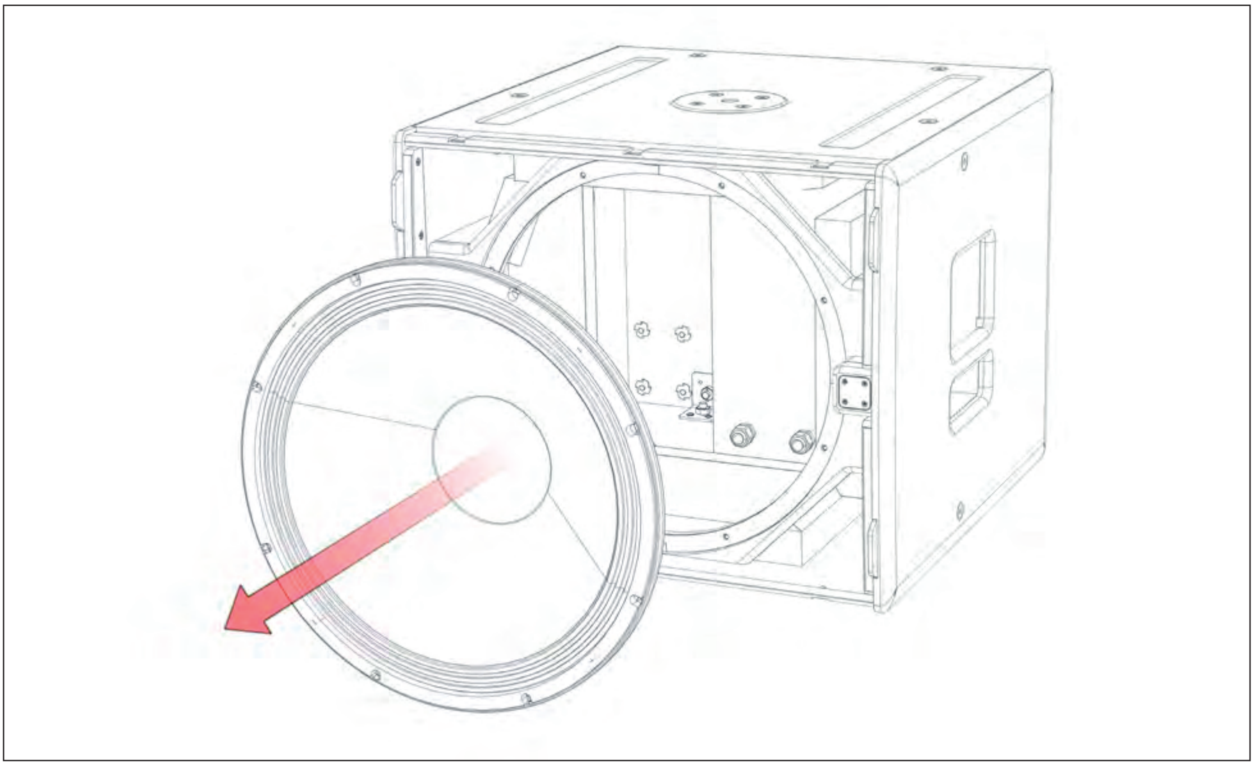


- Remove the grill and set it aside.



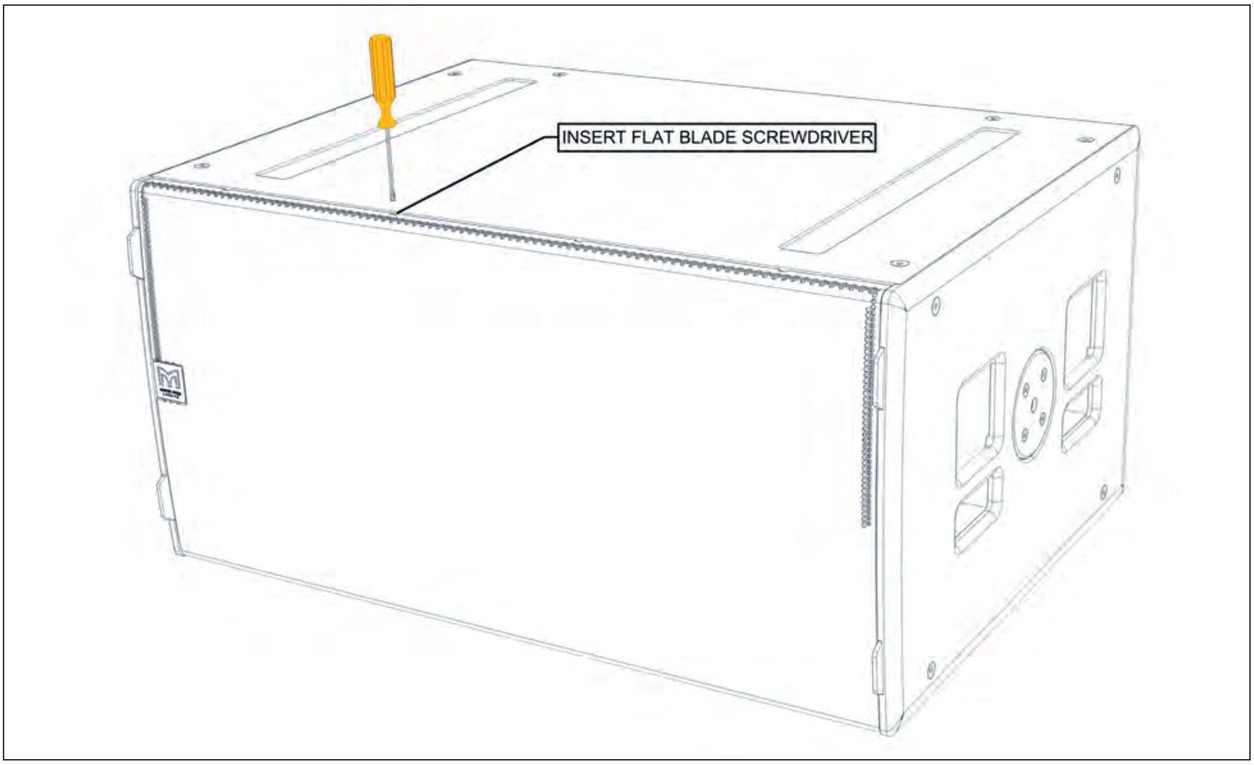
- Unscrew the eight M6 x 30mm bolts securing the drive unit. Carefully lift the drive unit out of the cabinet and disconnect the speaker cables, making note of the polarity for later reconnection.



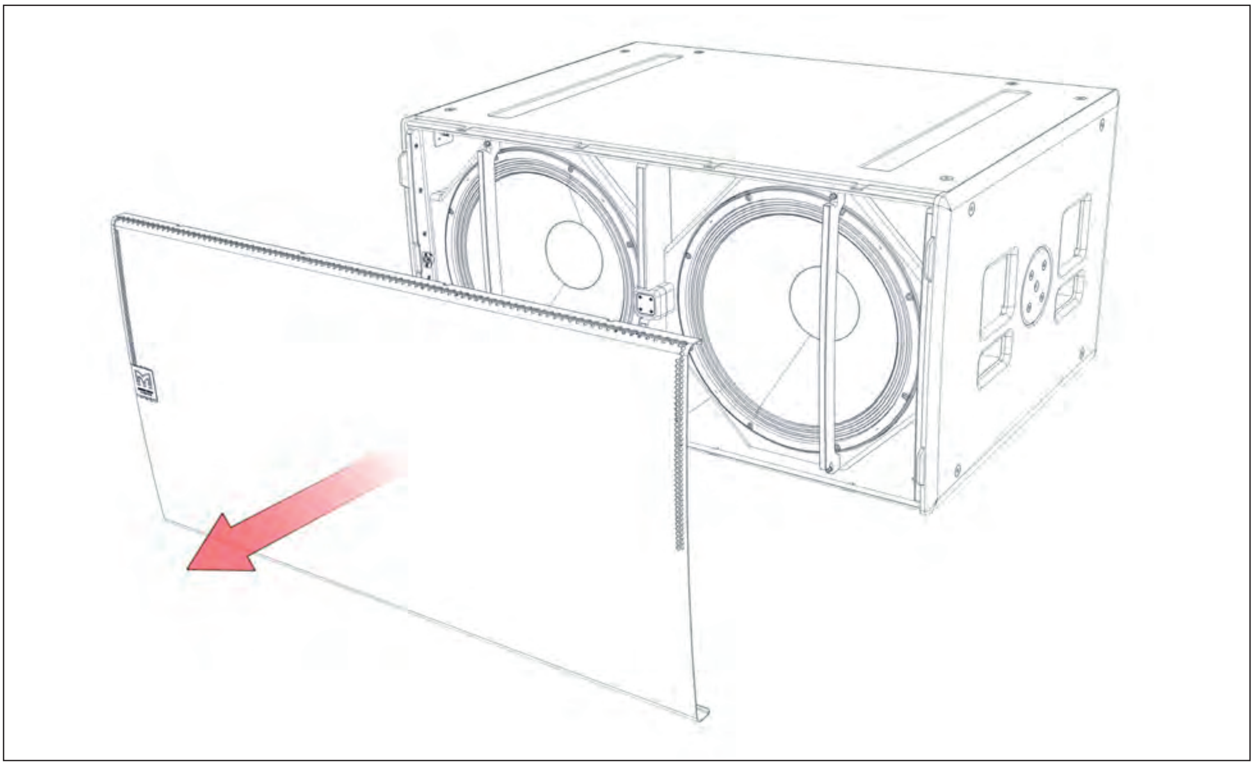


SX218 - Replacing a Drive Unit

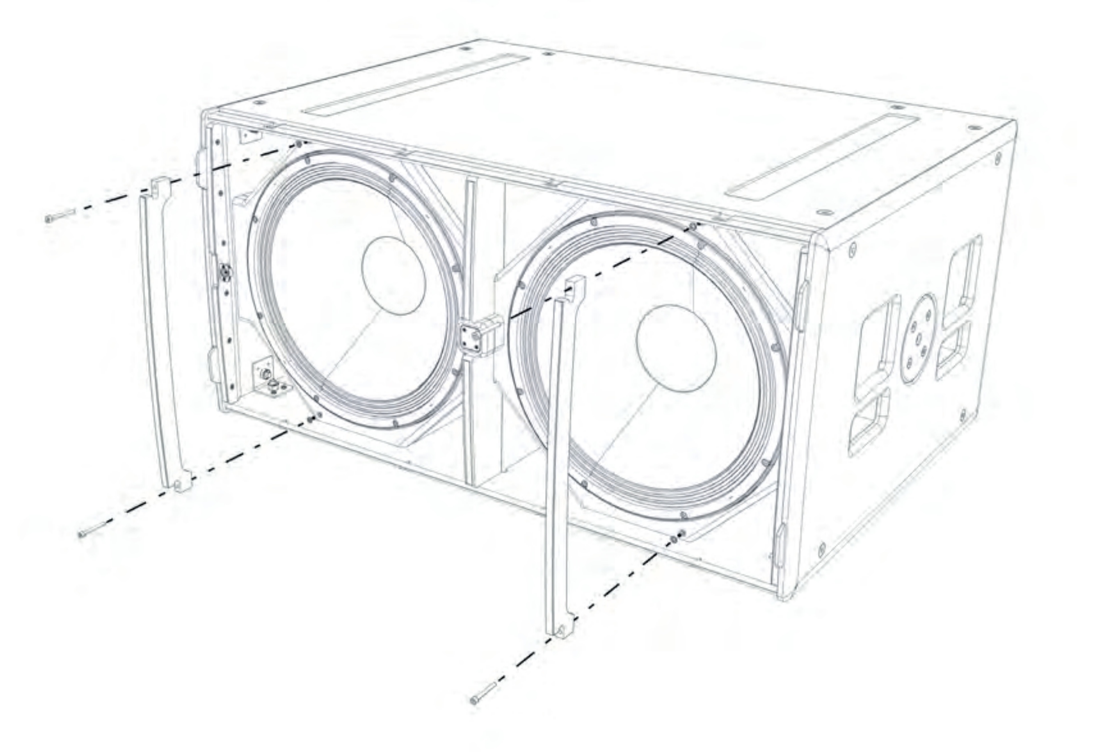
- The front grille locates into slots on the top and bottom of the cabinet. Remove it by inserting a flat blade screwdriver into slots in the grille edge and carefully levering it out of the slot.



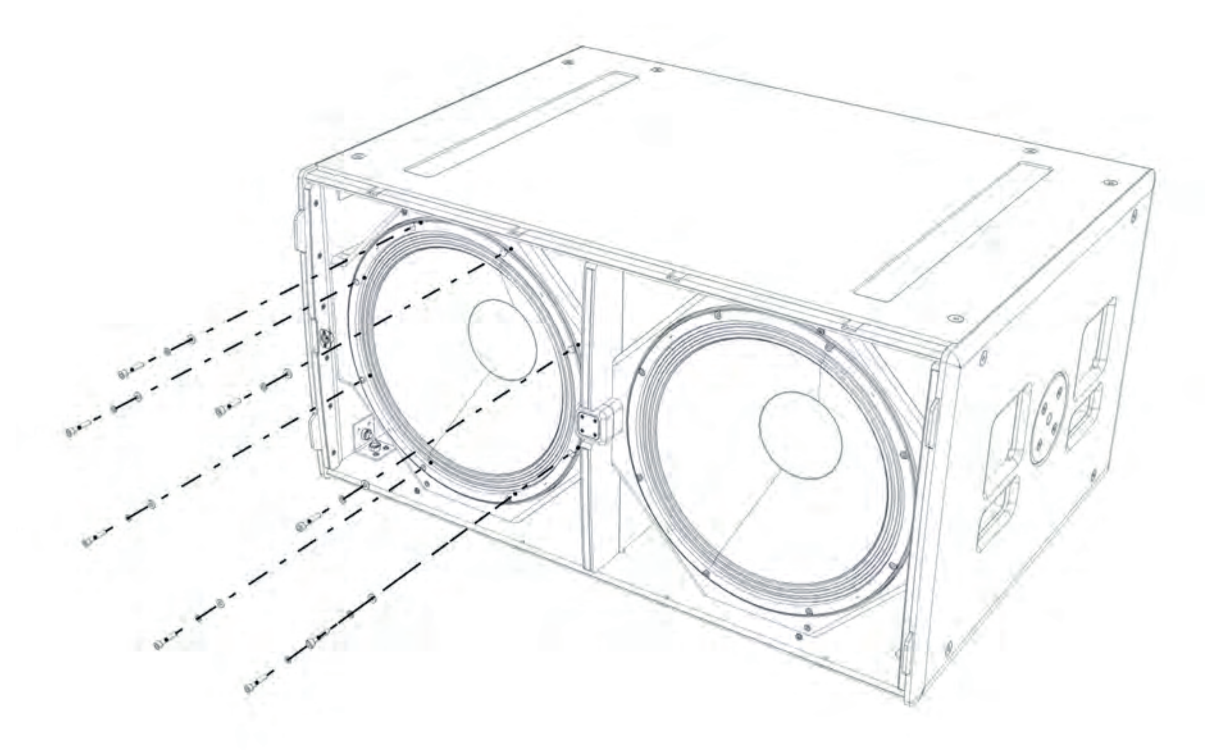
- Remove the grille and set it aside.



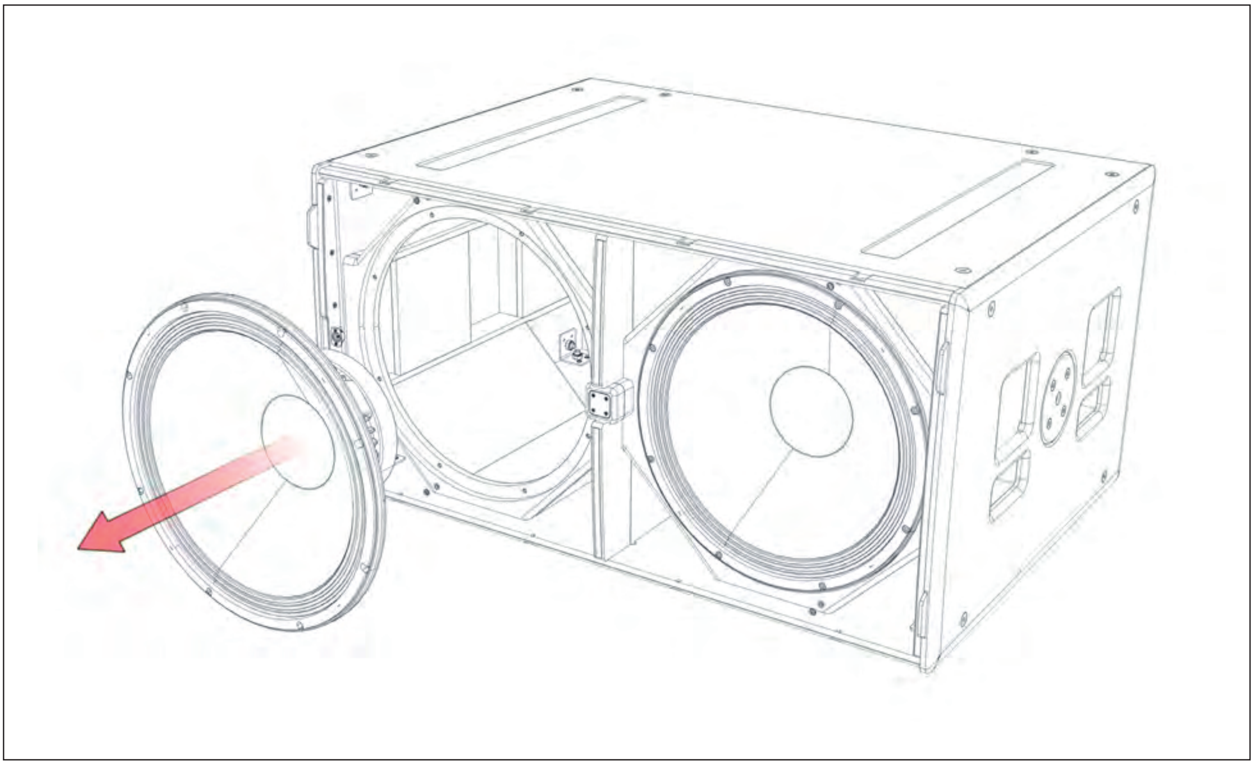
- Next unscrew the brace retaining screws and remove the grille braces.



- Unscrew the eight M6 x 30mm bolts securing the drive unit.



- Carefully lift the drive unit out of the cabinet and disconnect the speaker cables, making note of the polarity for later reconnection.



Specifications: WPM

TYPE	Two-way, passive line array element
FREQUENCY RESPONSE	76Hz - 18kHz ±3dB
MAXIMUM SPL @1M	130dB (1 cabinet)
DRIVERS	
LF	2 x 6.5” (165mm) contoured-diaphragm / 2” (50mm) edge-wound CCAW voice coil, neodymium magnet drivers, reflex loaded
HF	3 x 1.4” (35mm) aluminium dome / 1.4” (35mm) voice coil, neodymium magnet compression drivers on constant-directivity waveguide
SYSTEM AMPLIFIER	iKON iK42, iK81
SYSTEM RESOLUTION	1 to 4 enclosures per amplifier channel
NOMINAL IMPEDANCE	16 ohms
DISPERSION	100° horizontal (-6dB), 125° horizontal (-10dB)
CROSSOVER	1.2kHz passive
ENCLOSURE	Vertical trapezoid with 5° wall angle Multi-laminate birch and poplar ply construction
FINISH	Black textured paint
PROTECTIVE GRILLE	Black HEX perforated steel
CONNECTORS	2 x NL4 type
PIN CONNECTIONS (INPUT)	1+/1-
FITTINGS	Integral 3-point rigging system 2 x side pocket handles 2 x rear grip handles
FLOWN ARRAY MAXIMUM	16 enclosures in single array
DIMENSIONS	(W) 500mm x (H) 185mm x (D) 377mm (W) 19.7in x (H) 7.3in x (D)14.8in
WEIGHT	12kg (26.4lbs)
ACCESSORIES	Install Flying Frame Touring Flying Frame Rigging Pin

Specifications: SX118

TYPE	Single-driver, direct radiating subwoofer
FREQUENCY RESPONSE	47Hz - 150Hz ±3dB, -10dB @ 41Hz
SENSITIVITY	102dB
DRIVER	18” (460mm)/4” (100mm) voice coil, long excursion, ferrite magnet, waterproof cone
RATED POWER	1000W AES, 4000W peak
MAXIMUM SPL @1M	138dB
SYSTEM AMPLIFIER	iKON iK42, iK81
NOMINAL IMPEDANCE	8 ohms
DISPERSION (-6DB)	Omnidirectional/or Cardioid (paired)
ENCLOSURE	Multi-laminate birch and poplar ply construction
FINISH	Textured black paint
PROTECTIVE GRILLE	Black perforated steel
CONNECTORS	2 x NL4
PIN CONNECTIONS (INPUT)	LF: +1, -1 Link through: +2, -2
PIN CONNECTIONS (LINK)	LF: +1, -1 Link through: +2, -2
FITTINGS	Two skids on base, with mating channels on top Four rear-mounted 100mm (4”) castors M20 top-mounted thread plate for pole mounting 16 x M10 mounting points 2 x bar handles, 1 on each side 4 x fittings for optional transit cover
DIMENSIONS	(W) 600mm x (H) 509mm x (D) 632mm (760mm including castors) (W) 23.62in x (H) 20.04in x (D) 24.86in (29.90in including castors)
WEIGHT	47kg (104lbs)
ACCESSORIES	Transit cover

Specifications: SX218

TYPE	Dual-driver, direct radiating subwoofer
FREQUENCY RESPONSE	35Hz - 150Hz ±3dB, -10dB @ 30Hz
SENSITIVITY	105dB
DRIVERS	2 x 18” (460mm) / 4” (100mm) voice coil, long excursion
MAXIMUM SPL @1M	144dB
DRIVERS	2 x 18” (460mm) / 4” (100mm) voice coil, long excursion
SYSTEM AMPLIFIER	iKON iK42, iK81
NOMINAL IMPEDANCE	2 x 8 ohms
DISPERSION (-6DB)	Omnidirectional / or Cardioid (paired)
ENCLOSURE	Multi-laminate birch and poplar ply construction
FINISH	Black textured paint
PROTECTIVE GRILLE	Black perforated steel
CONNECTORS	2 x NL4 type
PIN CONNECTIONS (INPUT)	LF1: 1+/1- LF2: 2+/2-
PIN CONNECTIONS (LINK)	LF1: 1+/1- LF2: 2+/2-
FITTINGS	Two skids on base, with mating channels on top Four rear-mounted 100mm (4”) castors 24 x M10 mounting points 4 x bar handles, 2 on each side 4 x fittings for optional transit cover
DIMENSIONS	(W) 1085mm x (H) 537mm x (D) 792mm (W) 42.7in x (H) 21.1in x (D)31.2in
WEIGHT	102kg (225lbs)
ACCESSORIES	Transit cover

Specifications: MSX Passive

TYPE	15” reflex loaded subwoofer
FREQUENCY RESPONSE	50Hz - 150Hz ±3dB, -10dB @ 42Hz
SENSITIVITY	103dB
DRIVER	1 x 15” (380mm) / 4” (100mm) voice coil, ultra-long excursion, high efficiency ferrite magnet
MAXIMUM SPL @1M	133dB continuous, 136dB peak
NOMINAL IMPEDANCE	8 ohms
DISPERSION (-6DB)	Omnidirectional. Cardioid arrays possible using multiple MSX Passive enclosures
ENCLOSURE	Extensively braced multi-laminate birch-ply
FINISH	Textured black PU coating
PROTECTIVE GRILLE	Black HEX perforated steel
CONNECTORS	2 x NL4 type
PIN CONNECTIONS	LF: 1+/1-, Link Through: 2+/2
FITTINGS	Two skids on base, with mating channels on top M20 top-mounted thread plate for Variable Height Pole Two front-mounted latch plates for wheelboard Integral flyware for suspension of up to 4 MSX Passive Large bar handle on each side Optional weather protection cowl
DIMENSIONS	(W) 500mm x (H) 510mm x (D) 575mm (W) 19.7in x (H) 20.1in x (D) 22.6in
WEIGHT	43kg (94.6lbs)
ACCESSORIES	Transit cover Rain cowl Wheelboard

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